BONUS! FULL-SIZE PATTERNS

WHERE TO FIND FREE WOOD p.46

ISSUE 176 MAY 2007

Better Homes and Gardens®

WOOD®

Build it in a Weekend!

Display Shelves

plus

11 More Projects

- Outdoor Bench or Trellis
- 3 Picture Frames
- Caterpillar Pull Toy
- 4 Workshop Projects

- Asian-Style Box

39 Must-Have Tips & Skills!

Simple Biscuit Joints Make Assembly Easy

Trick Out Your Tablesaw

22 Great Gadgets

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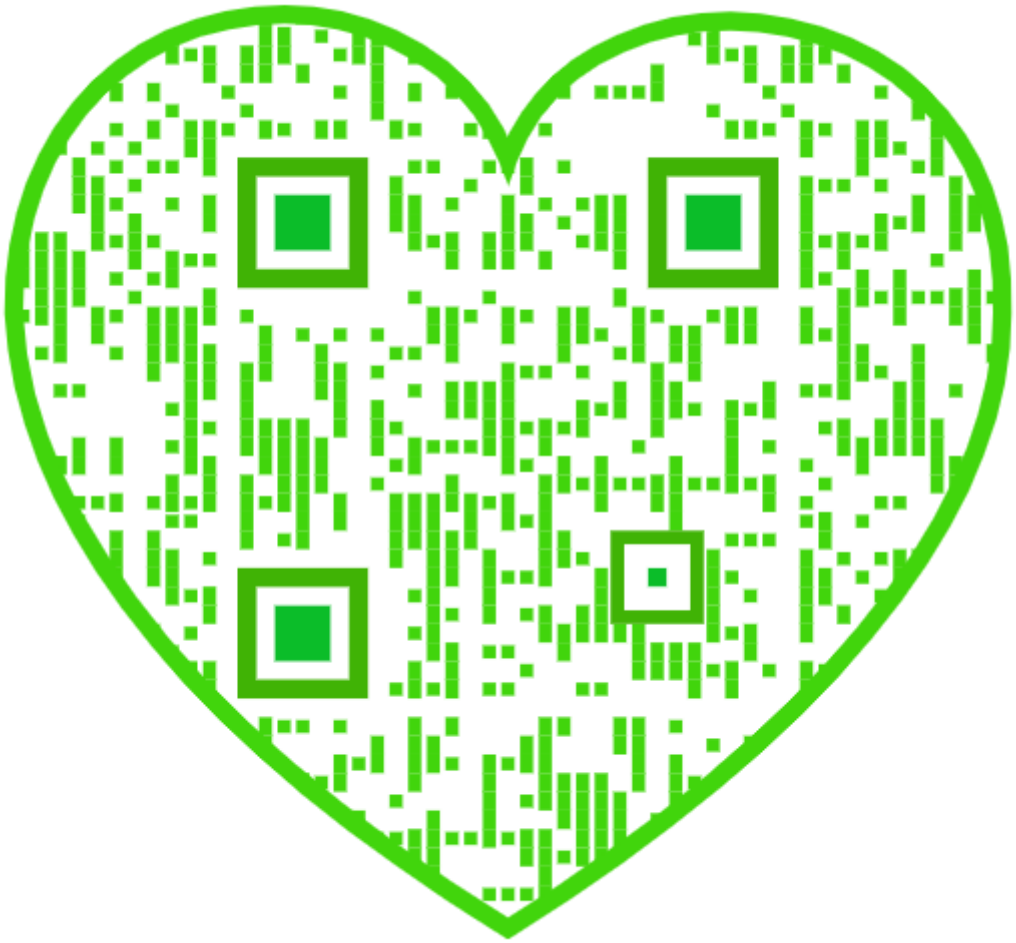

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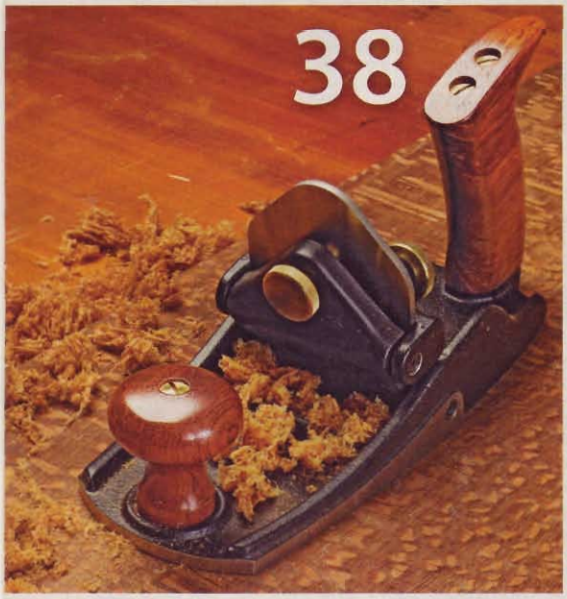
WOOD MAGAZINE SHOP TESTED APPROVED®

This seal is your assurance that we build every project, verify every fact, and test every reviewed tool in our workshop to guarantee your success and complete satisfaction.



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THE MOTHER LODE OF **FREE** WOODWORKING KNOWLEDGE

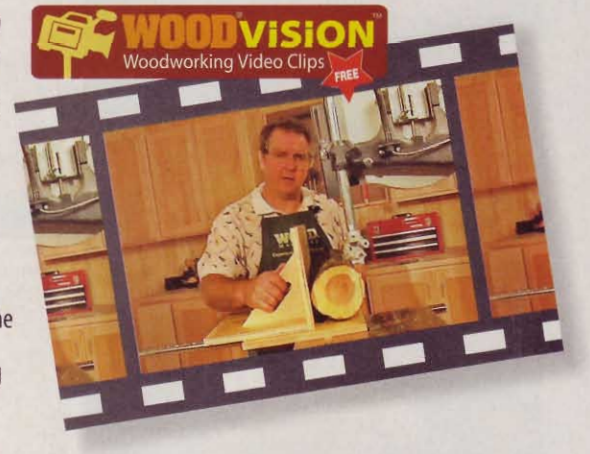
Find the largest collection of free woodworking information on the Internet—from tools to schools, from hardwoods to hardware—at WOODWorkersCenter.com. With links to more than 100 manufacturers and woodworking catalogs, locate exactly what you're looking for. Discover money-saving articles, too.

SEE THE "LUMBER MAKER" IN ACTION

The Bandsaw Lumber Maker on *page 90* turns found—even round—wood into flat, usable stock for projects. *WOOD* magazine's Marlen Kemmet shows how the jig works in a five-minute video at woodmagazine.com/videos.

MORE FREE VIDEOS

- Add a riser block to your bandsaw to boost its resaw capacity.
- See how to use two simple jigs to saw and sand to shape the graceful lid of the Pagoda Box on *page 40*.
- Learn how to set up and use a scraping plane to smooth figured wood.



IDENTIFY THAT FOUND WOOD

Intrigued by the idea of finding usable woodworking wood in your firewood pile (see *page 46*)? Then check out the WOOD Profiles section of our Web site at woodmagazine.com/woodprofiles. There, you'll learn the working characteristics of more than 120 American and exotic hardwoods and softwoods such as the stunning red-streaked boxelder, shown *left*.

TRY A CLASSIC COUNTRY FINISH ON OAK FURNITURE

You'll find four simple but unique finishes for oak in the article starting on *page 34*. But if you favor a more colorful country-style look, you can learn how to craft an easy-to-apply aged finish, shown at *right*, when you visit woodmagazine.com/countryoak.

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Mark built this walnut Arts & Crafts bed as a college graduation gift for his daughter, Carly.

CUSTOMER SERVICE
For several ways to reach us about specific matters, see *page 8*.

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Do you have the kind of shop other woodworkers like to visit? Is your shop filled with clever ideas that help you work smarter, faster, or safer? If so, submit your workshop for publication in **America's Best Home Workshops, Volume 2** (Volume 1, on sale at newsstands on 6/26/07, is shown *above*.

Size doesn't matter

Your shop doesn't have to be big, or nit-picky clean. The ideas could be storage solutions, task-specific jigs, shop tips, or the special way you designed, built, and outfitted your shop.

To be considered, send us your materials by 5/1/07; the first 100 to respond will receive a FREE Best-Ever Workshops magazine, a $6.99 value.

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- ❑ 3 to 5 photos showing the overall interior layout of your shop and 1 exterior photo, if applicable
- ❑ 5 to 10 close-ups of your problem-solving ideas, or dedicated machining or storage areas
- ❑ A rough-sketch floor plan that shows overall shop dimensions and the locations of doors and windows, tools, storage cabinets, workbenches, and wood storage
- ❑ A quick summary of shop specs, including the type of structure, with details about lighting, heating/air-conditioning, electrical service, and dust collection
- ❑ A short paragraph about why your shop is great and how it serves your woodworking interests

Mail your submission to:
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WOOD magazine
1716 Locust St., LS-221
Des Moines, IA 50309-3023

Or e-mail your submission to
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Submissions cannot be returned, but please include your name, address, telephone number, and e-mail address if available.

Editor's Angle

Challenges and Opportunities, Pagoda Style

You've no doubt heard the phrase, "In every challenge lies opportunity." The pagoda box project on *page 40* is a testament to the truth of that adage.

I well remember the day Marlen Kemmet, our managing editor, returned from a West Coast trip. He held a small and exquisite box made of exotic woods. "What do you think about doing this as a project in the magazine?" he asked.

"I like it!" was my quick reply. "But what about those upturned, curved lid corners? How will we tell readers to do that?" Turns out that the maker of the box Marlen was holding, master woodworker David Selditz of Bellingham, Washington (see his profile on *page 44*), shapes the lids freehand. But I wasn't convinced we mere mortals would have much luck trying that on the first go.

At times like these, we call in Kevin Boyle, our senior design editor. It's his job to make projects doable for you, or tell us "no way" (something he rarely says).

As Kevin sat before us, turning the pagoda-roof-shaped lid around in his hands, I watched his eyes for clues. First they opened wide, with eyebrows up. (Interpretation: "You guys have come up with a doozy this time.") Then his focus narrowed, eyebrows scrunched together. (Interpretation: "I just might be able to make this work.")

Then he said, "I think we can do it with a jig or two." Soon we were down the road of transforming pagoda-box challenges into opportunities for you. For example:

Challenge: Shaping that curvaceous lid.
Opportunity 1: Almost anything in woodworking is possible, given the right jig. The lid provided us with two good ones. The first jig helps you accurately and controllably bandsaw and drum-sand the concave lid top; the second lets you disc-sand the convex lid bottom. Just like that, the lid became a simple and fun exercise.

Opportunity 2: Many woodworking processes are a lot easier to understand after you see them demonstrated. So Master Craftsman Chuck Hedlund and Editorial Manager Dave Campbell got to work on a five-minute video showing you how to use the jigs to shape the lid. You can view or download the video for free at woodmagazine.com/videos. (Even if you're not building the pagoda box, you'll enjoy the free videos on the site.)

Trim router review: In the *last* issue we promised you a test and review of trim routers in *this* issue. As we were wrapping up that test, we learned of several new models and one that is being discontinued. So to make the article as timely as possible, we've taken the rare step of postponing that review until the *next* issue, #177. You can expect a stronger, even more-in-depth article as a result.

Bill Krier

Sounding Board

Our bulletin board for letters, comments, and timely updates

Invigorate sapwood for a rich, lustrous look

While finishing a poplar bookcase (shown at *right*) recently, I discovered that the lighter-colored sapwood soaked up more stain than the darker heartwood. Using your method for dealing with sapwood in issue 171 (September 2006) as a baseline, I tried several different methods to even out the color and found success with one that I'd like to share.

After raising the grain with water and then sanding it smooth to 220 grit, I brushed on glue size (eight parts water to one part Titebond III wood glue. Be careful when doing this to avoid overlapping strokes. But if it happens, just even it out with your brush or rag.) After that dried, I sanded it again with 220. Next, I applied one coat of water-soluble dark mission brown dye, followed by two coats of oil-based dark walnut stain. I topcoated the stain with one coat of clear shellac and three coats of wipe-on oil-based polyurethane. It's hard to tell the sapwood now from the heartwood.

—David Springer, Carmel, Ind.

Photo: David Springer

Photo: Neal Ray Shoger

Jim Bany, left, president of the Kansas City Woodworkers' Guild, presents a frame to VFW representative Bud Haney.

Picture this: Volunteers help to meet Unmet Needs

Woodworkers from around the U.S. have built and donated more than 350 picture frames as of Feb. 1, 2007, for the Unmet Needs program (issue 169, April/May 2006, page 93). On Oct. 18, 2006, the Kansas City Woodworkers' Guild presented more than 200 handcrafted mahogany frames to the Veterans of Foreign Wars Foundation, which administers the Unmet Needs program. The VFW Foundation uses the frames as gifts for families of military personnel, for awards given to volunteer military family members, family readiness groups, and other special items for the families of deployed service members, according to Crystal Lauver of the VFW Foundation. If you'd like to build and donate frames, go to woodmagazine.com/unmetneeds for plans and decals.

—WOOD editors

A real shipshape case

Just when my wife was urging me to find a better place to display one of my wooden model ships (an 1812 French frigate), issue 171 (September 2006) of *WOOD®* magazine arrived with the perfect project. In just a short time, I built a modified version of the tabletop curio case on page 54. Because the ship's size exceeded the dimensions in your plan, I had to expand the case to 14×28×30". I also made it from pine to match the Southwestern style furnishings in my home.

—Bert de Pedro, Silver City, N.M.

Photo: Bert de Pedro

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Ask WOOD

Answers to your questions from letters, e-mails, and WOOD Online®

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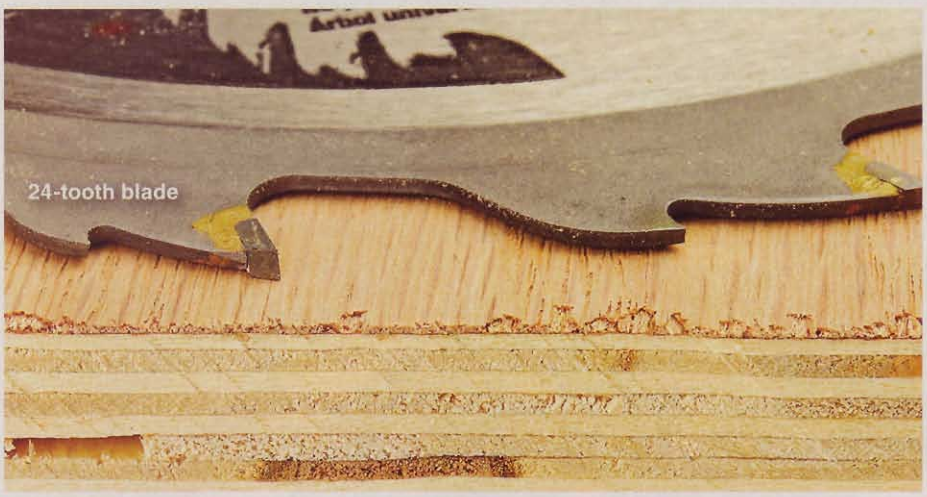


Choose the best small blade for big jobs

Q: I need a 7¼" blade to cut 4×8' sheets of plywood for cabinets. What style of portable circular saw blade will give me the best performance and the least amount of splintering?

—Charles Brozek, Zion, Ill.

A: Those basic 24-tooth blades that come with many circular saws were meant for rough carpentry, Charles, not chip-free cuts in veneer plywood. For smoother cuts with less tear-out, move up to a 40-tooth blade. They cost only slightly more than those basic blades—we spent $15—but the resulting cut quality is worth the added price, as you can see *above*.

For even less tear-out, attach a zero-clearance base to the circular saw plate. But handle the saw carefully because the telescoping blade guard will not extend through the zero-clearance base to cover the spinning blade.

Like a zero-clearance insert on a tablesaw, this base keeps wood fibers along the edges of the cut from being pulled upward by the blade teeth. To make a zero-clearance base, cut a scrap piece of ¼" hardboard to match the size of the saw's base plate. Then retract the saw blade above the base, and attach the zero-clearance plate using double-face tape (or screws, if the base has mounting holes). Make certain the edge of the insert on either side is flush with the base plate edge.

Rest the zero-clearance base on the edge of your workbench where the blade won't cut the bench. Start the saw, and plunge the blade through the zero-clearance base to roughly the desired depth. Use the saw as you normally would, alone or with a straightedge.

Shed light on window finish

Q: I am in the process of refinishing wooden casement window frames. What kind of finish should I use? Is there a difference between spar varnish and marine varnish? Would any products hold up better than these?

—Leon Wallwey, Midland, Mich.

A: Neither spar varnish nor marine varnish will work best on window frames, although for different reasons, Leon. Window glass allows enough UV light through to degrade the UV inhibitors in most oil-based spar varnishes. Once the UV light breaks down the wood fibers, the wood releases the finish and begins to discolor and decay.

Many true marine varnishes use UV-resistant phenolic resins and tung oil, but they leave a flexible, soft finish not meant for interior use. Marine varnishes tend to be much more expensive and harder to find than spar or interior film finishes.

For an interior finish that uses UV-resistant phenolic resins and tung oil, one option is Waterlox Original Sealer and Finish (call 800/321-0377 or visit waterlox.com). At $27 a quart, it's still not cheap. But you also can buy it in 2-oz. containers for $5.70 each for small touch-up jobs. It won't eliminate this chore, but refinishing your window frames won't become an annual ritual.

Whichever replacement finish you choose needs to be applied to sound wood. So sand and restain sun- and water-damaged areas before refinishing.

continued on page 12

Here's the catch with collets

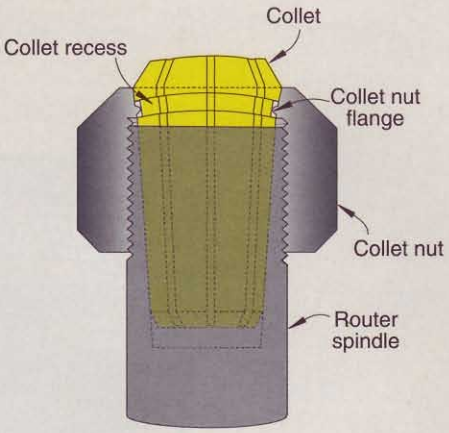
Q: When I loosen my router's collet nut, the collet won't release the bit. I have to turn the nut by hand almost two full turns, and then the nut tightens again. Then I have to use the wrenches again to loosen the nut and free the bit. Do I have a problem?

—John Frey, Berryville, Ark.

A: Relax, John. The free travel in the collet nut doesn't signal a problem. It's called a self-releasing collet, and it's a good feature. Inside a self-releasing collet, the collet nut flange pushes the collet into the tapered hole at the end of the router spindle, tightening the collet on the bit. Loosening the nut to remove a bit allows the nut to spin within the collet recess. But the collet and bit remain wedged within the spindle until the nut flange pushes up on the collet, popping the collet loose.

If you don't notice this sort of play in the collet nut, *that* could be a problem. It could mean you've placed the bit too deep within the collet, preventing the collet jaws from gripping the bit shank. Avoid this problem by always keeping bits about 1/16" from the bottom of the spindle.

SELF-RELEASING COLLET PARTS



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Avoid stone storage snafus

Q: I use and store my water stones and grinder wheels in our heated basement. Can I use nontoxic antifreeze instead of water and allow them to soak in my unheated garage?

—David Hayes, Milwaukee

A: You can avoid the threat entirely by storing stones and wheels dry, David. Most stones require only a five-minute soak before use. After soaking a stone, place a small puddle of water on its surface to test for readiness. If water stays on the surface, the stone is ready to use. If it sinks into the stone, soak it longer. Afterward, dry the stones thoroughly, away from direct sun or high heat, and store them in a ventilated container. Store wheels as the grinder instructions recommend.

Some stones deteriorate if stored soaking in chemicals or even just water. Before doing so, read the water stone's instructions, or ask the supplier how to store specific stones.

Stones are designed to work only with water to create a slurry for honing.

How to place a fair price on walnut

Q: A friend has some rough-sawn walnut that was in his late father-in-law's basement for 30 years. Now, he wants to get rid of it. We think it was from the same tree. What is a fair price for 30-year-old, air-dried 5/4 walnut? I'd like to get a good deal, but I also want to be fair with my friend.

—Dennis Almond, Riedsville, N.C.

A: First assess the quality of the lumber, Dennis, especially if it has been stored in a basement where dampness could have caused warpage and discoloration. Lumber that's been stored outdoors at any time also might suffer insect damage, especially from powder-post beetles. Then use a moisture meter to check several boards throughout the stack. Moisture should be 6 to 10 percent for your area. Compare pieces to see if they come from the same tree. If so, that could allow you opportunities to bookmatch boards in glue-ups. After you check a sample with a metal detector, plane it to uncover any flaws, decay, or undesirable color.

Now that you know what you're buying, begin assessing its value by checking your local newspaper classified ads for comparable lumber, even if it's kiln-dried. Then contact area lumberyards for their rough-sawn walnut prices. For example, we checked Riedsville-area hardwood dealers and learned kiln-dried 5/4 walnut was selling for around $4.75 per board foot for quantities less than 100 board feet. Increase or decrease your offer according to the quality of the wood; then make an offer.

Stuck with clogged nozzles

Q: How do you keep the nozzles of spray adhesive cans from clogging? I have tried tipping the cans upside down and spraying, but it hasn't worked. Now, I have two half-full cans with clogged nozzles.

—Nate Denniston, Charlotte, Mich.

A: To salvage your half-empty cans, Nate, try soaking the nozzles for 5 minutes in lacquer thinner in a small glass or metal container such as a baby food jar. Then wipe the nozzle clean and reinstall it on the can.

Tipping the can upside down and spraying helps clear the nozzle in most cases, so continue that practice. Then take an added step against clogs and build-up by wiping a small amount of petroleum jelly on the outside of the nozzle before you store the can.

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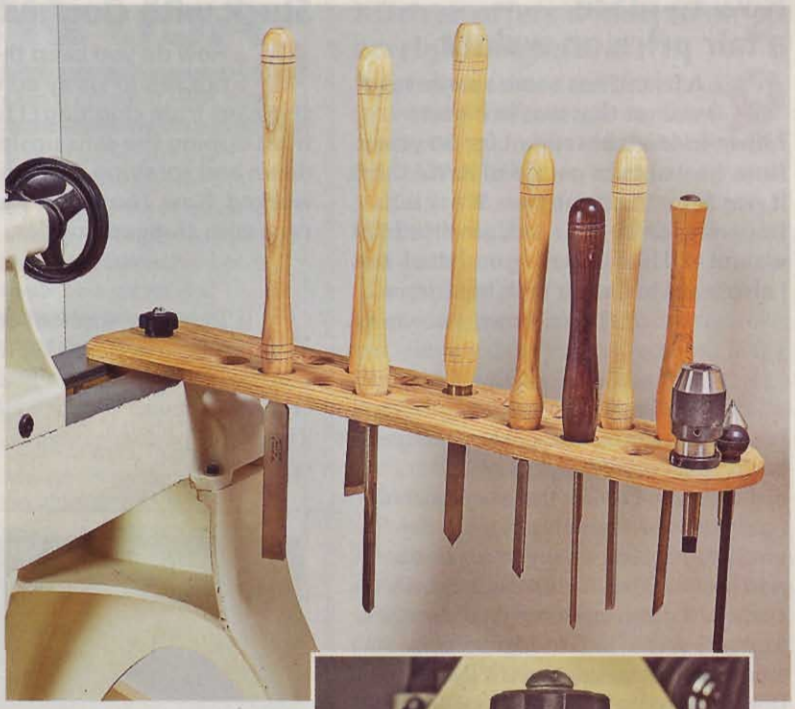
Circle No. 154

Swing-Arm Lathe-Tool Holder

Keep your lathe tools and accessories close at hand with this easy-to-make organizer.

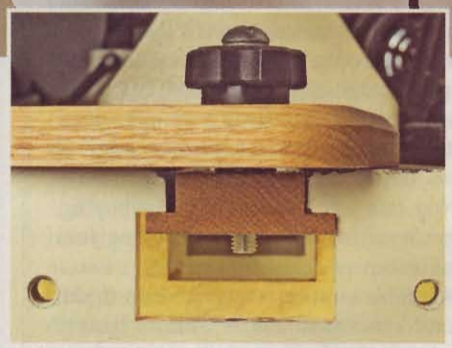


Build a holder as shown or customize it to fit your tool needs. Begin by measuring the distance between your ways to create the sliding support shown in the drawings and the inset photo. Make the sliding support about ⅛" narrower than the opening between the ways, and the top edge of the support ⅛" lower than the top edge of the ways.

Our pivoting arm measures 31½" long, but you can shorten it if you need fewer tools at lathe side. To create the holes for the tools, measure the diameter of your lathe-tool ferrules and use Forstner or spade bits to drill holes ⅛" larger than that dimension. For skews, where the blade can be wider than the ferrule, measure the widest diameter of the tool handle and drill the mounting hole ¼" smaller.

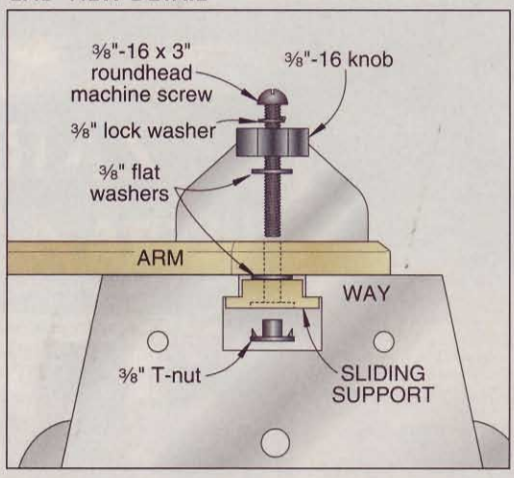
Once assembled and attached to the lathe bed, the holder can stay put on your lathe stocked with turning tools; or remove the tools and slide off the holder, hanging it from a wall hook for later use.

Project design: **Bill Adler,** West Des Moines, IA

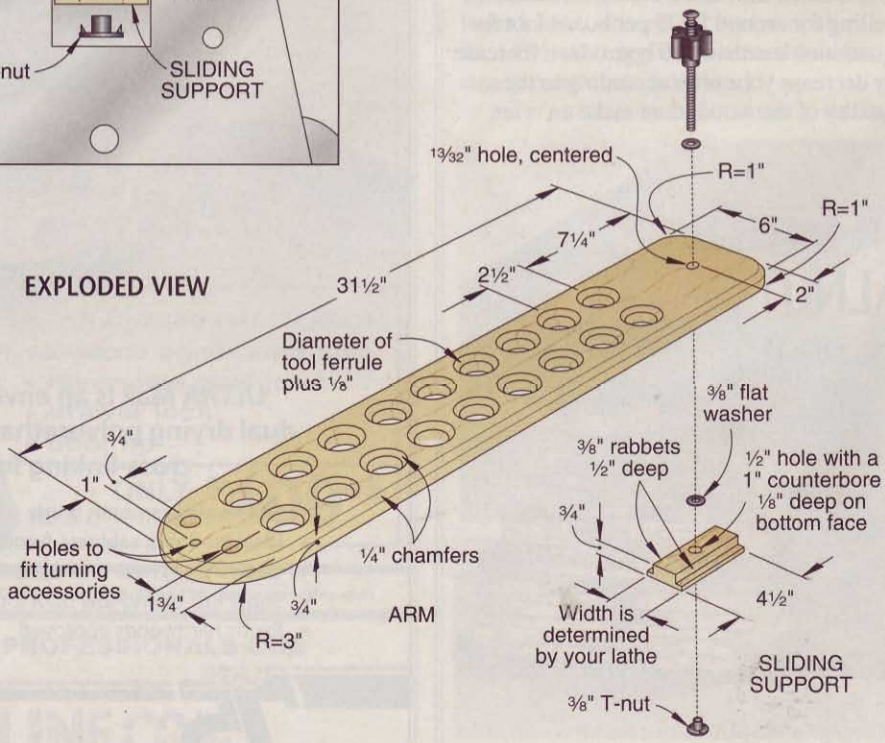


Tighten the knob to secure the sliding support and arm to the metal ways.

END VIEW DETAIL



EXPLODED VIEW



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Three-Way Miter Joints

This baffling but beautiful union shows no end grain, and goes together easier than you might think.

Three-way-miter-joint parts flow into a delicate point at the corners. Yet hidden splines make these joints strong as well as decorative, letting you add drama to a variety of projects, such as the table shown on *page 20*.

Although simple to cut and assemble, the joint's miter cuts demand accurate saw and miter gauge setups. First align your tablesaw's miter slot dead-on parallel with the blade, and the blade 90° to the table. Next, install a miter gauge extension roughly 4" longer than your longest project part, and set the angle to 45°. For absolute accuracy, perform the frame miter test shown in the **Shop Tip** at *right*.

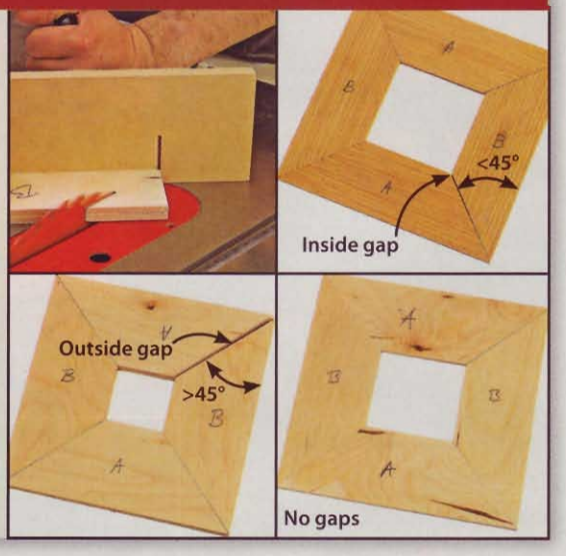
As you plane stock to size, check each piece for squareness at all four corners and, using a caliper, **Photo** ①, check for equal width and thickness. Machine extra stock for practice cuts and stop blocks. For this demonstration, we ripped pieces 1½" square and 6" over length.

SHOP TIP

Fine-tune your miters

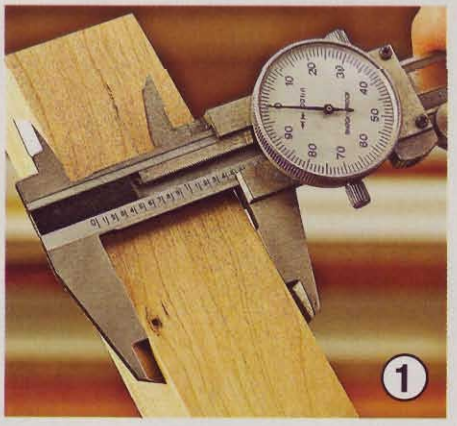
This frame test will uncover even minor miter gauge misadjustments. Begin with strips of scrap cut at least 2½" wide and 10" long. Set the miter gauge to 45° and cut opposite sides in pairs. Fit three sides of the frame tightly together and check for gaps after inserting the fourth piece.

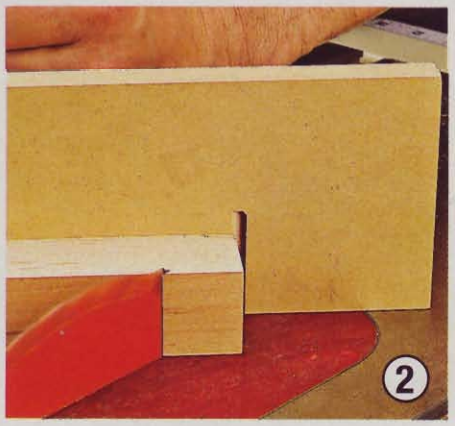
A gap on the inside of the frame means the miter gauge is cutting less than 45°, while a gap on the outside indicates an angle greater than 45°. When all eight cuts form four miters with no gaps, your miter gauge is dead-on accurate.

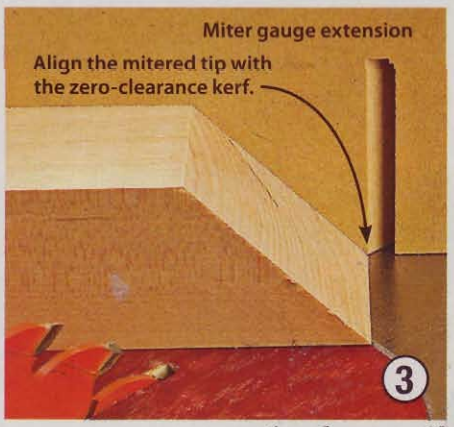


Cut the first pairs of miters

After fine-tuning your miter gauge and cutting a zero-clearance kerf in a miter gauge extension, hold or clamp the workpieces firmly against the extension and cut a 45° miter on one end, **Photo** ②. Turn the mitered edge up, and align the miter tip with the zero-clearance kerf, **Photo** ③. Cut the second miter, and check that the two cuts match and that the end comes to a sharp tip,







continued on page 18

Photo ④. Repeat these pairs of miters on one end of each part.

To cut parts to length, clamp a 45° mitered stop block to the miter gauge, Photo ⑤. This protects the pointed ends and keeps you from accidentally cutting miters on the wrong edge or face. Repeat the miter cuts on all parts.

Rout the spline slots

To reinforce these end-to-end joints, you'll add ¼"-thick plywood splines to slots in each miter. To prevent misalignments, precisely center each slot on the miter. Start by installing a ¼" straight bit in a table-mounted router, with the height ⅛" less than half the thickness of your workpieces. Then set the router table fence to center the cut on the end of a scrap the same width as the parts.

Make a test cut on the scrap and measure from the cut and both edges of the scrap using a dial caliper, Photo ⑥. Adjust the fence until the dimensions are equal on both sides of the slot.

Attach a stopblock to the router table fence to keep the cut from intruding onto the face or edge of the workpiece. Then rout slots into each miter, Photo ⑦.

Cut splines to fit the slots

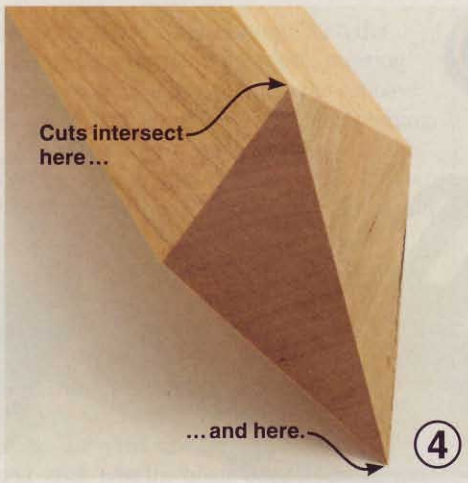
Measure the slot depth, and cut strips of ¼"-thick plywood 1/32" narrower than the slot depth. Then bandsaw the strips into square splines and chamfer all edges of each spine by rubbing them against 100-grit abrasive on a flat surface. Each spline should drop just more than halfway into the slots, Photo ⑧.

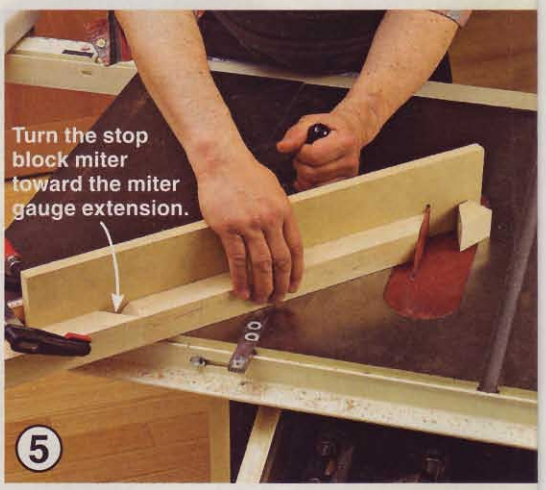
Build the joints

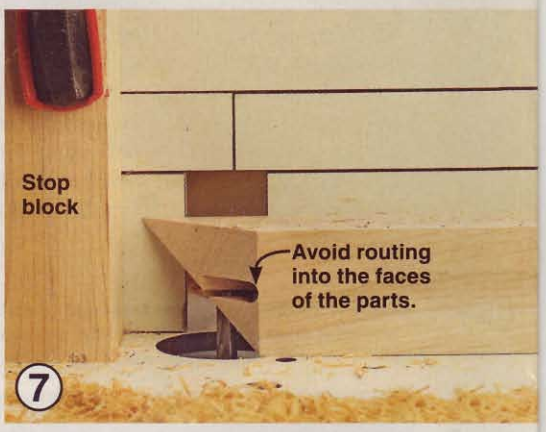
Start by assembling four pieces to create a frame. Working on a dead-flat surface, such as a bench or saw table, insert the splines between each piece and check the fits for snugness. Then apply a white glue to the splines and the miters to be joined. We choose white glue because it dries clear and performs as well as yellow glue. Press the pieces of each joint tightly together and tape them in place on the top and bottom, Photo ⑨. Avoid dripping glue into the slots for the other two splines. If your project uses an opposing frame, assemble that as well. If your project uses a bound panel, insert it before taping the joints.

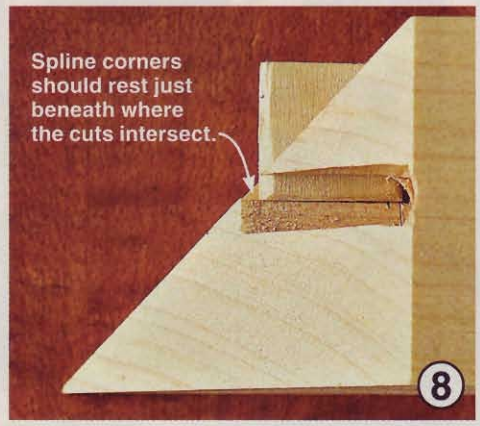
To connect two frames, glue and insert the two remaining splines in each joint, Photo ⑩. Then glue the four connecting pieces in place and tape each joint securely, Photo ⑪.

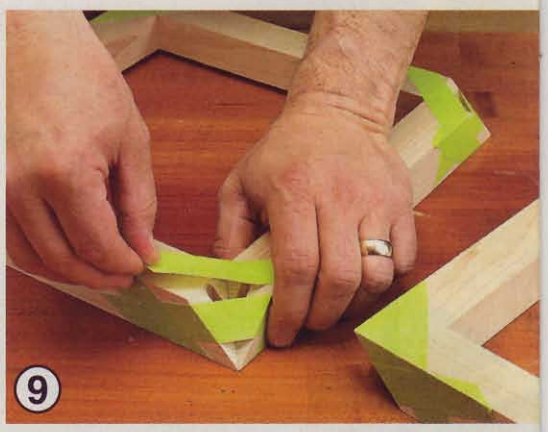
continued on page 20

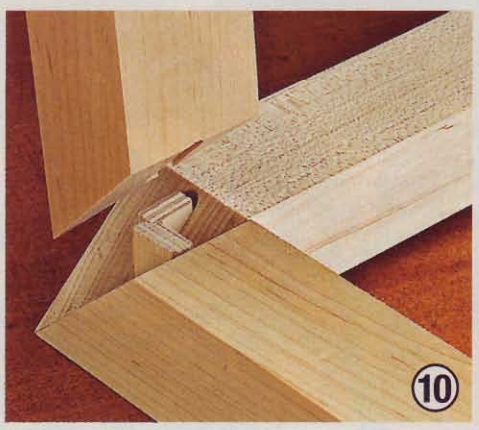


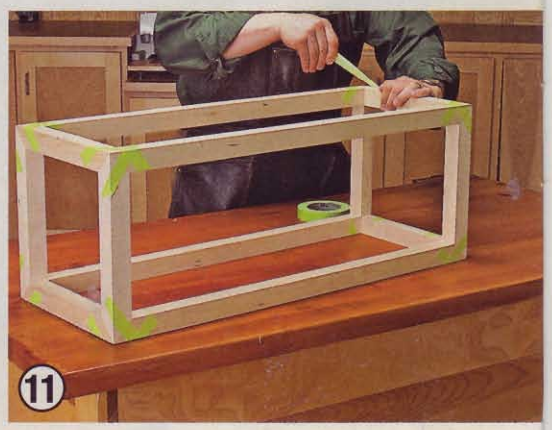












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After the glue dries, remove the tape, and sand the joints smooth, as shown in **Photo** (12). Avoid accidentally sanding over the edges or points. Should you discover tiny gaps, fill them with a paste made from sanding dust of the same wood species mixed with white glue that's thinned 25 percent with water.

Try different variations

In addition to creating a simple cube or rectangle, you can modify three-way miter joints by adding loose or bound panels or panes of glass. To hold the loose top panel for this table, **Photo** (13), rabbet the inside top edge of each piece in the top frame before assembly.

For a more dramatic effect, rabbet the inside top edges of the top frame, and then cut grooves on centerlines beneath the rabbet to hold a bound panel so you can display items beneath an acrylic or glass top, as shown on *page 16*.

Split Decisions

Prevent accidental cracks in your workpieces by implementing these proven tips.

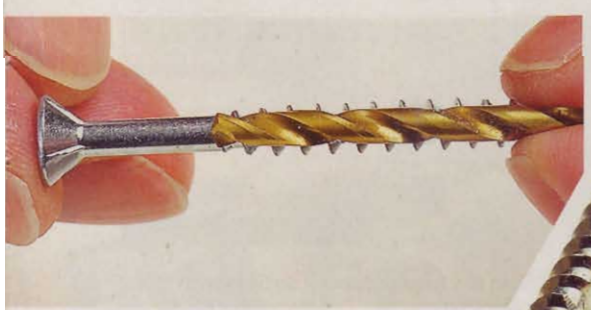
A split in a workpiece, especially one that's been machined to finished dimensions, can force you to make time-consuming changes or repairs when you'd rather be finishing a project. Because they're easier to avoid than fix, make the following tips full-time habits.

TIP 1: Predrill for screws and nails.

Drill correct-size shank- and pilot-holes for screws, according to the chart at *right*, or make a good guess by eyeballing, as shown *below*. This proves especially critical near the ends and edges of a workpiece, which split easier than the field. With some softwoods you can get by without holes by using self-tapping screws (which bore their own pilot holes), shown *below right*. But these screws will split many hardwoods and even some softwoods such as cedar and redwood. The same goes for medium-density fiberboard (MDF), which splits easily. When in doubt, play it safe: You can't go wrong with shank- and pilot-holes.

You also should apply the same guidelines when hammering nails. You can get by most times without pilot holes in softwood, but it's best to not take chances. To avoid a split, drill a pilot hole roughly three-fourths the diameter of the nail shank.

Find the Right Pilot Hole For Your Screws			Screw Gauge					
			#4	#6	#8	#10	#12	#14
Screw Type	Flathead wood screws	Shank hole	7/64	9/64	5/32	3/16	7/32	1/4
		Pilot hole (hardwood)	5/64	3/32	7/64	1/8	9/64	5/32
		Pilot hole (softwood)	1/16	5/64	3/32	7/64	1/8	9/64
	Multi-purpose screws	Pilot hole (hardwood)	5/64	7/64	1/8	9/64	5/32	3/16
		Pilot hole (softwood)	1/16	3/32	7/64	1/8	9/64	5/32



Determine a screw's pilot-hole size by holding a drill bit against it. The appropriate bit will cover the shank but not the threads.

Self-tapping screws feature a groove at the tip that bores its own pilot hole.

TIP 2: Don't overdrive screws.

That last little oomph can cause a wood split, as shown at the *top of this page*, especially in softwoods and softer hardwoods. Instead, find the appropriate clutch setting on your drill/driver to avoid overtightening screws. Do this on test material in your shop, or set your clutch on a low setting and ramp it up as needed. You also can leave the screw slightly proud of the surface and then finish driving it by hand with a screwdriver.

continued on page 22

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Avoiding Workshop Goofs

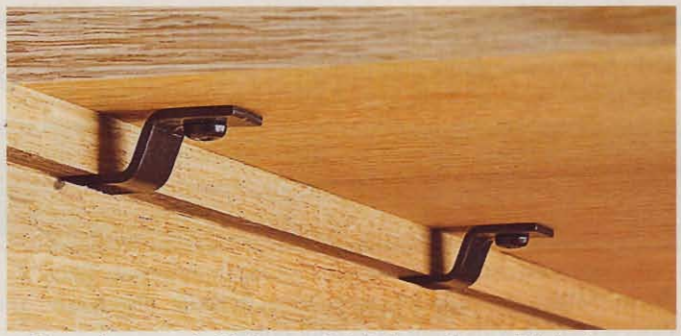
TIP 3: Dry-fit all assemblies.

Assembling pieces without glue allows you to check the fit of joints and avoid potential splits at glue-up. Tenons too tight in their mortises can cause splits, as shown *below*. A good mortise-and-tenon joint should go together easily by hand, but not be loose enough to fall apart. Avoid too-thin mortise walls, which split easily, by never making them less than ¼" thick. You also can divide your workpiece thickness into thirds, creating two mortise walls and one tenon of equal thicknesses.

Trim tenons so they slide into mortises snugly. This tenon was too thick, causing the thin mortise wall to split.

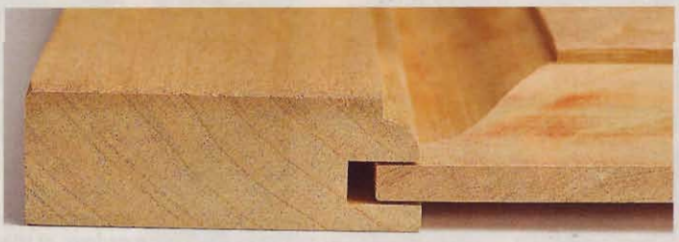
TIP 4: Allow for wood movement.

Wood shrinks and swells as it adjusts to seasonal changes in humidity, so design and assemble projects with this in mind. Fasten wide tops to cases with hardware, such as that shown *below*, designed to hold securely but still allow wood movement. Screwing or gluing tops tight to a case likely will result in a split top when the wood moves.



Tabletop fasteners hold the top tightly but still can slide in the saw-kerf groove to allow for wood expansion across the grain.

Frame-and-panel assemblies, such as the one shown *below*, also need room for swelling and shrinking. Leave about a ⅛" gap in each groove for unglued panels to expand.



Cut panels short of a tight fit in the frame grooves, such as with this cutaway of a rail-and-stile cabinet door.

Source

Tabletop fasteners: Rockler part #34215, pack of 8, $2.30, call 800/279-4441 or rockler.com.

8 Easy steps to installing a riser block

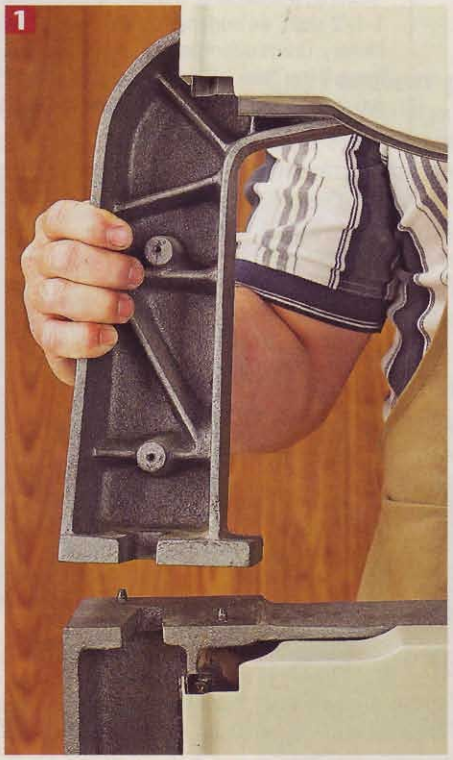
Boost your bandsaw's resawing capacity by 6" when you add this simple-to-install accessory.

Watch a FREE 4-minute video showing these installation steps in action at: woodmagazine.com/videos

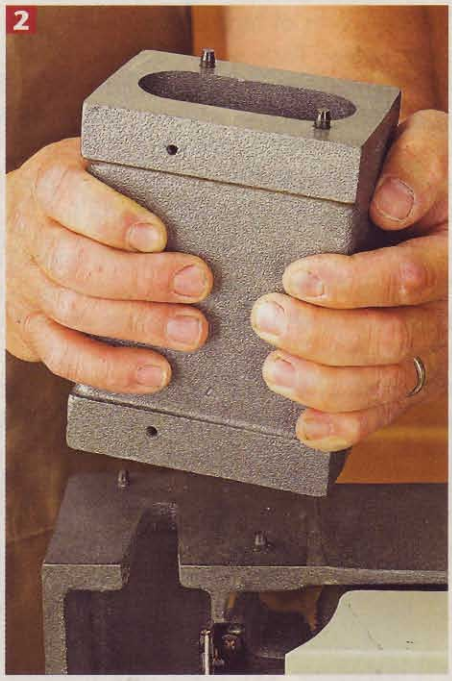
Sometimes an extra 6" of resawing capacity on your bandsaw can make a huge difference. Say you want to cut veneer or book-matched panels from a beautifully figured board that's too wide to fit between your bandsaw table and upper blade guides. Wouldn't it be great to solve the problem with an inexpensive kit and half an hour's work?

What you need is a riser block—a simple extension that fits between the base and arm of a typical cast-iron bandsaw frame. Not all saws accept a riser block, but many popular 14" models do. (Check your owner's manual or ask your dealer to find out if you have the option.) Your riser block kit should also include a longer guide post, connector bolt, blade, and blade guards. Expect to pay your dealer between $60 and $90 for the entire works.

Begin by removing the blade, upper blade guides, guide post, and both blade guards. Store the parts in a labeled box or bag. Next, follow the steps shown here to install the riser block kit. Although you can do it alone, you may want to enlist an assistant to help when you reinstall the saw arm.



Remove the bolt that holds the saw arm to the base. The arm simply lifts off, but be prepared—it's heavy and awkward.



The typical riser block includes indexing holes on the bottom and matching pins on the top, so it's self-aligning. If your riser block has no pins, align the outer edges flush with the base. Reinstall the saw arm, as shown in the photo at *the top of the page.*

Remaining steps on page 26

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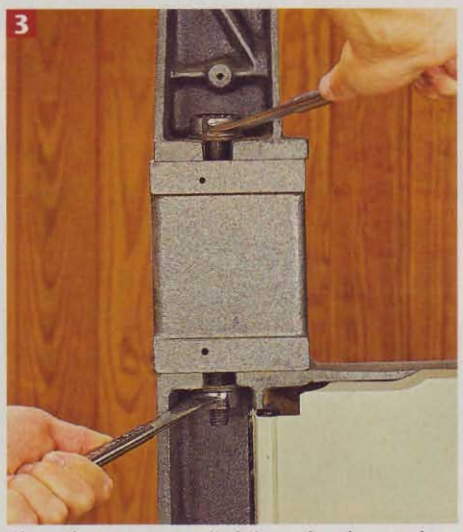
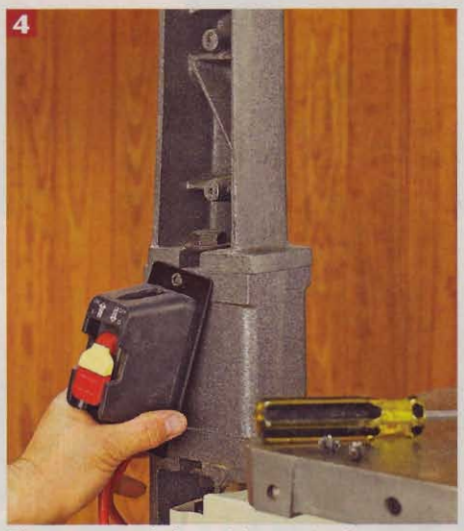
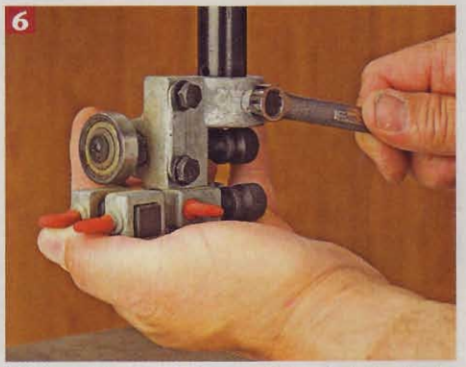


Place the connector bolt into the slot on the saw arm, and set the saw arm atop the riser block. Access is tight, but you can reach the connector bolt head and nut with box-end or open-end wrenches. (On our bandsaw, the head and the nut take different-size wrenches.) Tighten the bolt securely.

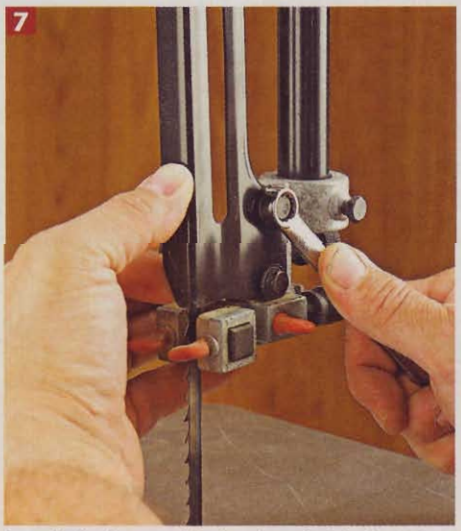


The power-switch position varies from one bandsaw to another; ours stays at its original height by attaching to threaded screw holes in the riser block. If your switch moves to a higher position, you might have to increase the cord's available length; sometimes that's as simple as removing a wire tie.

Now, start to install the other components of the riser-block kit. The longer rear blade guard mounts just like the original one. The guard shown *above* fits over two attachment posts, and two screws secure it in place.



Blade guides come in a variety of styles, but most reattach easily to their new guide post. Simply slide the upper blade guides onto the new post, and then tighten the unit in place. On this model, a single bolt does the job.



Install the longer blade, then finish the job by adding the new front blade guard. Again, it's a one-wrench procedure.

Lay a long straightedge across both wheels, and check to make sure it touches the rims at all four possible contact points. If so, the wheels are in the same plane, or "coplanar." To eliminate any gaps, turn the adjustment knob to tilt the top wheel. For more on bandsaw wheel alignment, see *WOOD* magazine 144 (October 2002), page 80.

Super-simple

Shelves for Show

BONUS: See a Slide Show of extra project assembly shots at: woodmagazine.com/slides

PROJECT HIGHLIGHTS

- It assembles quickly and easily with biscuits, screws, and a dado joint.
- Overall dimensions are 44" wide × 17½" deep × 79" high.
- Materials needed: Red oak (we used quartersawn) and red oak plywood.

Skill Builders

- Plunge in and learn the ABCs of biscuit joinery.
- Discover how to assemble a large project in stages with a few clamps.

Start with the legs

1 Cut the front/back and side legs (A, B) to the sizes listed [**Materials List**, *page 32*]. Lay out the angled end at the bottom of a leg [**Drawing 1**]. Bandsaw and sand to the line. Using this leg as a template, mark the angle on the remaining front/back and side legs. Bandsaw and sand them to shape.

2 Pair together the front/back and side legs (A, B). Noting the orientation of the angled ends for each pair [**Drawing 2**], identify the location (left front, right rear, etc.) and the *inside* face on each leg to ensure correct machining and assembly. Then, using a dado blade in your tablesaw, cut a ¾" dado ¼" deep on the *inside* face of each side leg, where dimensioned, to fit the front/back legs [**Drawings 1** and **1a**].

3 Mark centerpoints on masking tape for ¼" holes ⅜" deep on the *inside* face of the side legs (B) [**Drawing 1**, **Photo A**] to receive ¼" shelf supports. Using a brad-point bit wrapped with a piece of masking tape for a visual depth stop, drill the holes. Sand the legs to 220 grit.

4 For each pair of legs (A/B), glue and clamp the front/back leg (A) into the dado in the side leg (B), keeping the ends flush.

Make the rail assemblies

1 Cut the top/bottom front rails (C), top/bottom back rails (D), top side rails (E), bottom side rails (F), and top cleats (G) to the sizes listed.

2 Mark centerlines for #20 biscuit slots on the front/back legs (A) and parts C through G, where dimensioned [**Drawings 1** and **3**]. Using your biscuit joiner with the parts clamped to your workbench for safety, plunge a centered slot at each marked location, except the mating locations on the front/back legs and *outside* face of the top/bottom front and back rails (C, D). You'll plunge these after assembling the top and bottom rail assemblies.

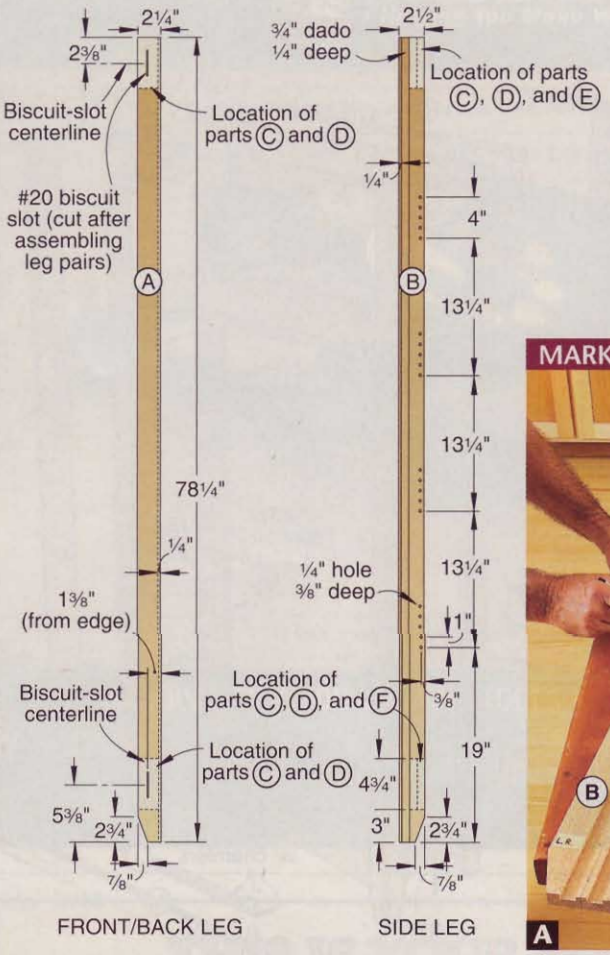
3 To mount the top (O) later, mark centerpoints ⅜" apart for drilling end holes to form a centered ³⁄₁₆" slot ⁹⁄₁₆" long at each end of the top cleats (G) [**Drawing 3a**]. Drill ³⁄₁₆" holes at the marked points. Then drill overlapping holes to complete the slots. Now drill a centered countersunk shank hole in the *bottom* face of each cleat.

4 Mark the centers and ends of the arches on the top/bottom front rails (C) and bottom side rails (F) [**Drawing 3**]. Draw the arches using a fairing stick. (For a free fairing stick plan, go to woodmagazine.com/fairing.) Bandsaw and drum-sand the arches to the marked lines.

5 Sand parts C through G smooth. Then glue each top side rail (E) to a top cleat (G), keeping the parts square. Next, glue, biscuit, and clamp the side rail/cleat assemblies and remaining center top cleat to the top back rail (D) [**Drawing 3**]. (Positioning the parts upside down makes this easy.) Now add the top front rail (C) [**Photo B**].

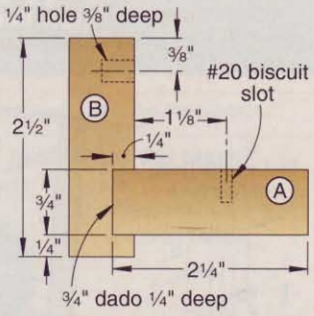
6 To assemble the bottom rails and shelf, glue, biscuit, and clamp together the bottom front rail (C), back rail (D), and side rails (F). Measure for equal diagonals to verify square. Next, cut the bottom shelf (H) to size to fit the assembly. Sand smooth. Now glue the shelf to the assembly, keeping the edges and ends flush.

1 LEGS
(Inside face of left-front and right-rear leg pairs shown)

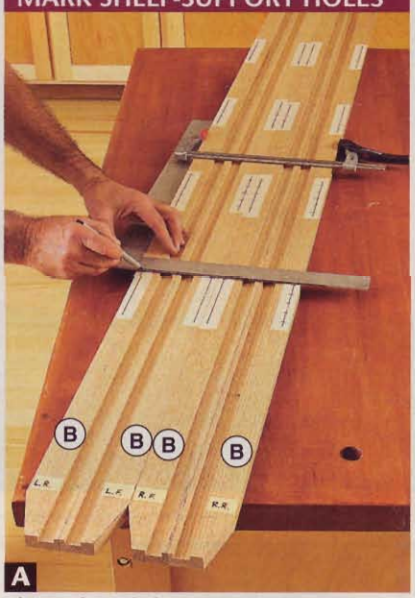


Note: Left-rear and right-front leg pairs are mirror image.

1a TOP VIEW
(Left-front and right-rear leg pairs shown)

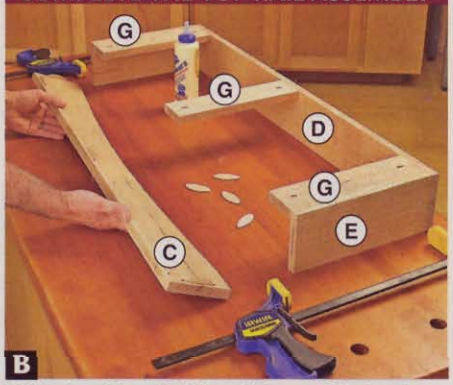


MARK SHELF-SUPPORT HOLES



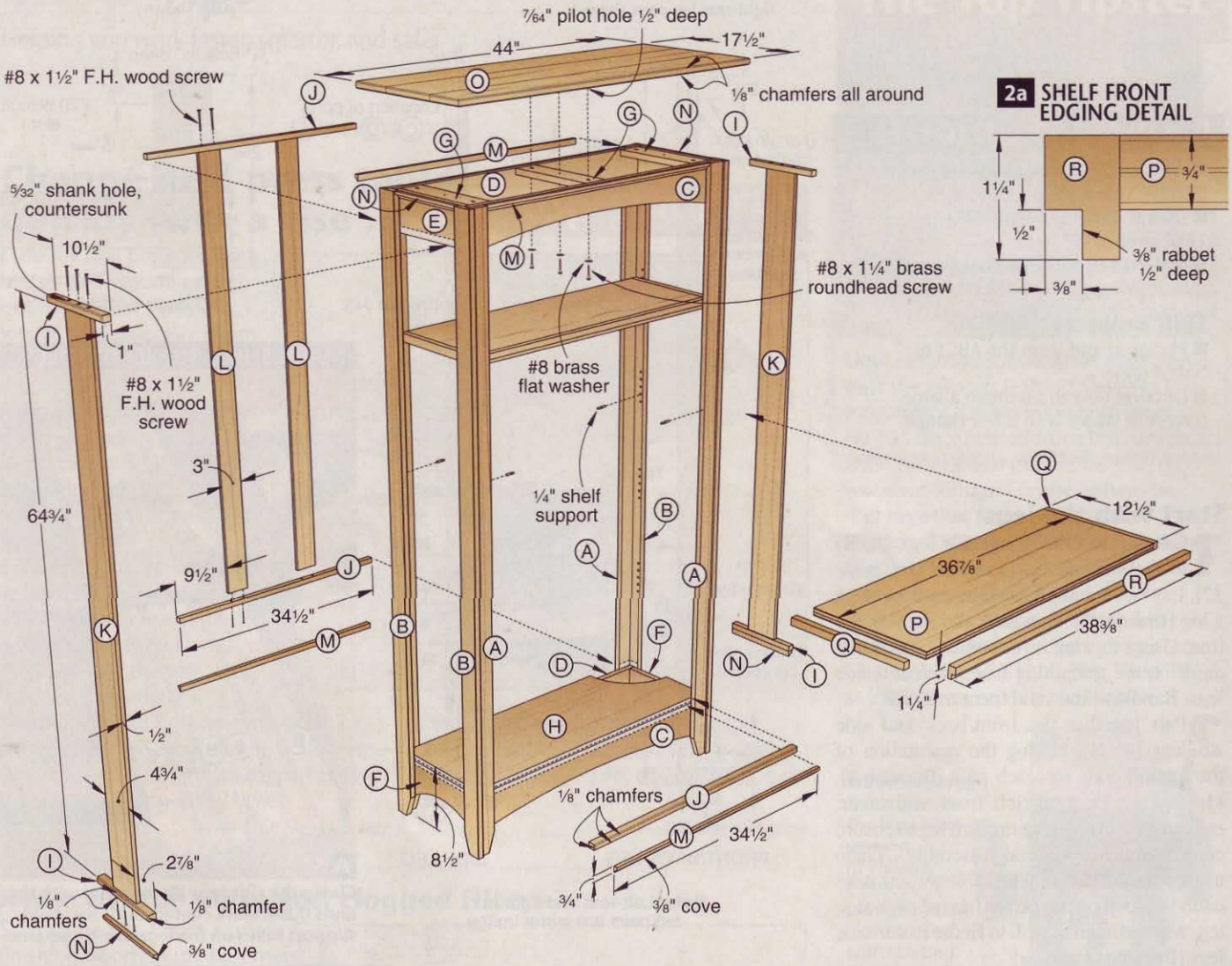
Clamp the side legs (B) together with the ends flush. Mark centerpoints for shelf-support holes on the legs using a square.

COMPLETE THE TOP RAIL ASSEMBLY



With the side rails (E) and cleats (G) glued to the back rail (D), glue, biscuit, and clamp the front rail (C) to the assembly.

2 EXPLODED VIEW

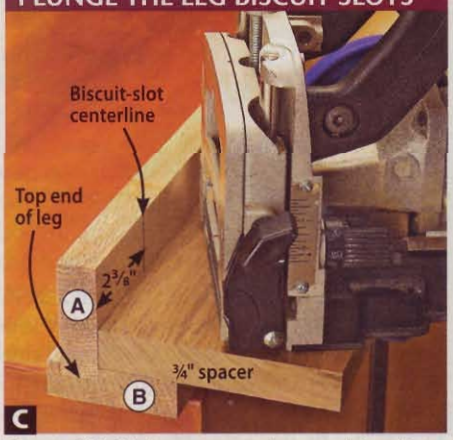


2a SHELF FRONT EDGING DETAIL

7 To cut the biscuit slots in the front/back legs (A), place a ¾"-thick spacer under your biscuit joiner and plunge the slots at the marked locations [**Photo C**]. (This positions the center of the slots 1⅛" from the bottom of the spacer.) Again using the spacer, cut the mating slots in the *outside* face of the top/bottom front and back rails (C, D).

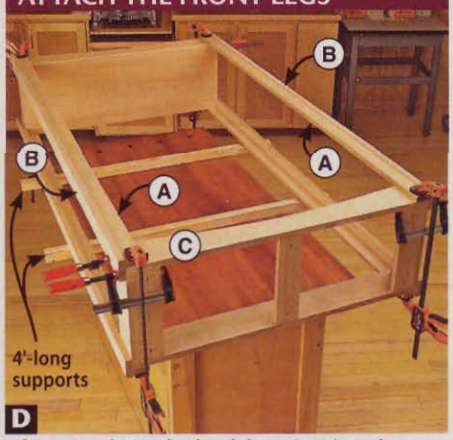
8 Glue, biscuit, and clamp the back legs (A/B) to the top rail/cleat assembly (C/D/E/G) and bottom rail/shelf assembly (C/D/F/H) [**Drawings 2** and **3**], making sure that the legs and top rail/cleat assembly are flush at the top. Then add the front legs to the assemblies [**Photo D**].

PLUNGE THE LEG BISCUIT SLOTS



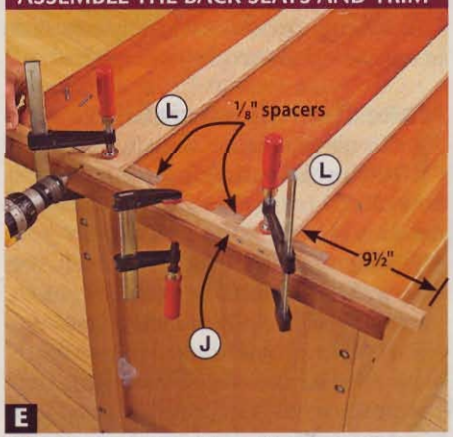
Place a ¾"-thick spacer under your biscuit joiner on the *inside* face of a side leg (B). Plunge the slot into the front or back leg (A).

ATTACH THE FRONT LEGS



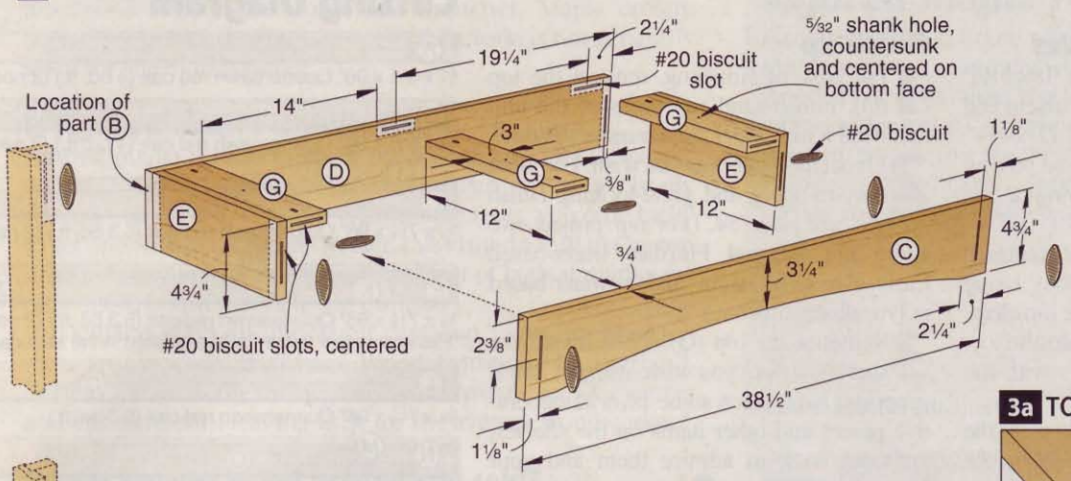
After attaching the back legs (A/B) to the rail assemblies, turn the unit over and glue, biscuit, and clamp the front legs in place.

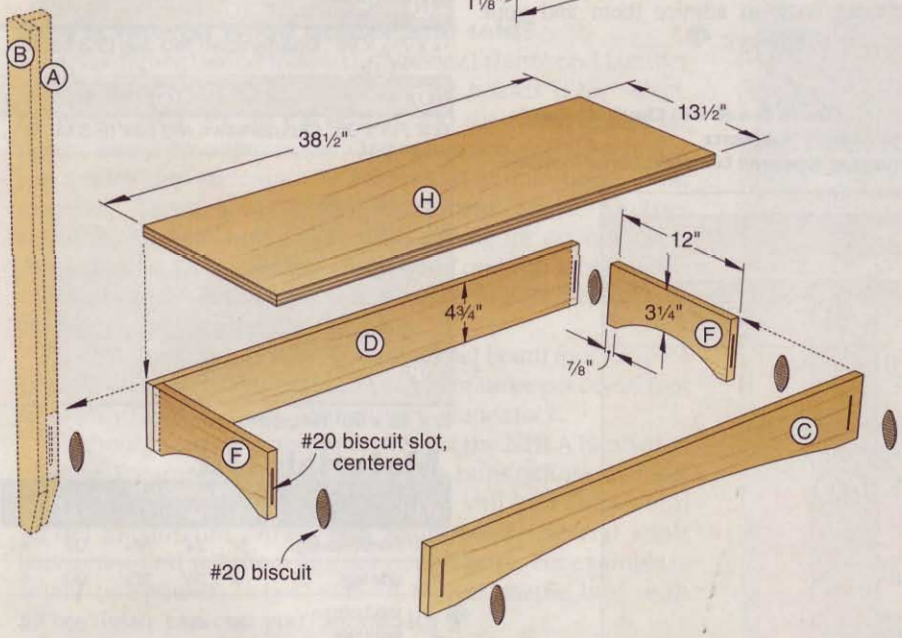
ASSEMBLE THE BACK SLATS AND TRIM



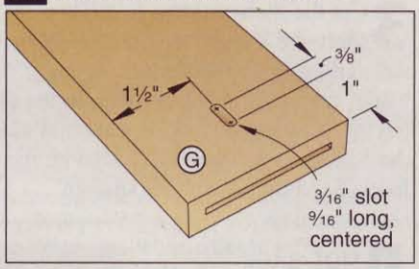
With the back slats (L) on ⅛" spacers and positioned 9½" from the ends of the back trim (J), screw-mount the trim to the slats.

3 TOP/BOTTOM RAIL ASSEMBLIES





3a TOP CLEAT SLOT DETAIL



Add the trim and slats

1 Cut the side trim (I) and front/back trim (J) to the sizes listed. (To ensure a snug fit, we measured between the legs for the exact lengths of the trim. Then we identified the locations of the pieces to ensure correct assembly.) Now cut the side slats (K) and back slats (L) to the indicated sizes.

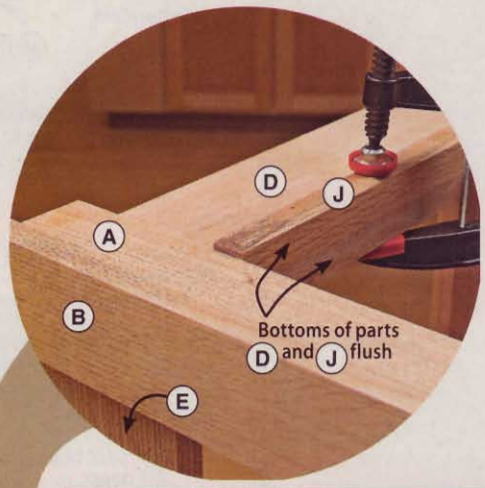
2 Rout ⅛" chamfers along the *outside* edges and ends of the side trim (I) and front/back trim (J) [**Drawings 2** and **4**]. Sand the trim and slats (K, L).

3 To assemble the top and bottom back trim (J) and back slats (L), lay out the parts with the *outside* faces up on a flat worksurface. Place spacers under the slats to position them ⅛" from the *inside* face of the trim [**Drawing 4**, **Photo E**], and locate the slats 9½" from the ends of the trim [**Drawing 2**]. Clamp the trim and slats to your worksurface. Then drill mounting holes through the trim and centered into the slats, and drive the screws. Again using the spacers, mount the side trim (I), centered end to end, to the side slats (K).

4 To mount the back trim/slat assembly (J/L), apply glue to the *inside* (nonchamfered) edges of the trim. Then clamp the assembly in position on the shelving unit, keeping the *bottom* face of the top trim and bottom edge of the top back rail (D) flush [**Drawing 4**, **Photo F**]. Note that the *top* face of the bottom trim (J) is ¼" proud of the bottom shelf (H). Now mount the side trim/slat assemblies (I/K) to the unit, positioning them in the same way.

5 Glue and clamp the bottom front trim (J) to the bottom shelf (H), flush with the top face. Sand the joint smooth.

6 To form the front/back and side cove trim (M, N), cut a ½×6×36" blank. Rout a ⅜" cove along each edge of the blank. Then rip a ¾"-wide strip from each edge. Repeat to make four more strips. Then crosscut the front/back and side trim pieces to length from the strips to fit snugly between the legs. Glue and clamp the trim pieces in place [**Drawing 2**].



MOUNT THE BACK TRIM/SLATS

Glue and clamp the back trim/slat assembly (J/L) in place, aligning the *bottoms* of the top back trim (J) and back rail (D) flush.

On to the top and shelves

1 Edge-join stock to form an 18×44½" piece for the top (O). Then crosscut and rip the top to the finished size of 17½×44". Rout ⅛" chamfers along the top and bottom edges and ends of the top [**Drawings 2** and **4**]. Sand the top smooth.

2 Clamp the top (O) to the unit, centered front-to-back and side-to-side. Using the mounting holes and slots in the top cleats (G) as guides, drill pilot holes into the top. Drive the brass roundhead screws with flat washers [**Drawing 2**].

3 Cut the shelves (P) to size. Then cut the shelf end and front edging (Q, R) to the sizes listed to fit the shelves. Using a dado blade, cut a ⅜" rabbet ½" deep in the front edging [**Drawing 2a**]. Now glue and clamp the edging to the shelves, flush with the top faces. Sand the assemblies smooth.

Finish up

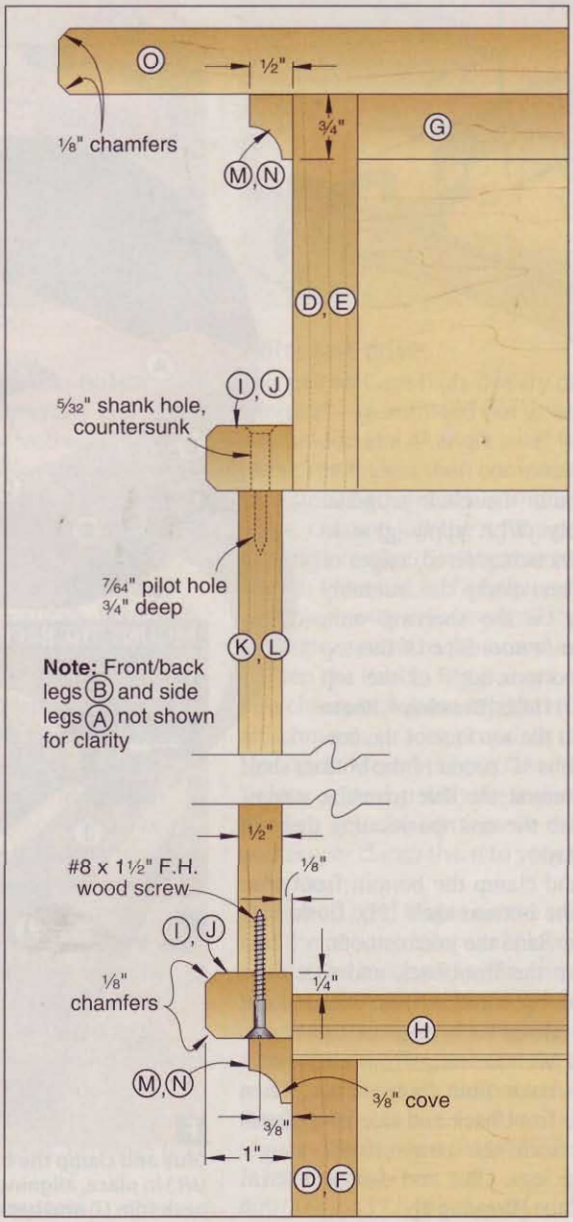
1 For ease of finishing, remove the top (O). Finish-sand any areas of the unit that need it to 220 grit, and remove the dust.

2 Finish the project as you wish. For three easy-to-apply and great-looking finish options, see *page 34*. (For our project, we chose the General Finishes water-based Early American stain and a water-based polyurethane topcoat.)

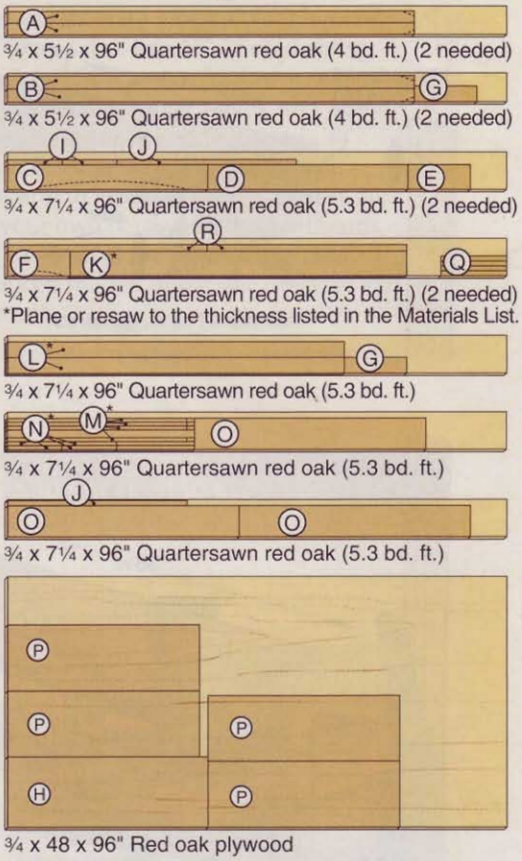
3 Remount the top (O). Then install the shelves, where you wish, using ¼" shelf supports. Now place some favorite decorative pieces and other items on the shelves, and step back to admire them and your amazing handiwork.

Written by **Owen Duvall** with **Chuck Hedlund**
Project design: **Jeff Mertz**
Illustrations: **Roxanne LeMoine; Lorna Johnson**

4 SIDE/BACK SECTION VIEW



Cutting Diagram



Materials List

Part		FINISHED SIZE T	W	L	Matl.	Qty.
A	front/back legs	¾"	2¼"	78¼"	QO	4
B	side legs	¾"	2½"	78¼"	QO	4
C	top/bottom front rails	¾"	4¾"	38½"	QO	2
D	top/bottom back rails	¾"	4¾"	38½"	QO	2
E	top side rails	¾"	4¾"	12"	QO	2
F	bottom side rails	¾"	4¾"	12"	QO	2
G	top cleats	¾"	3"	12"	QO	3
H	bottom shelf	¾"	13½"	38½"	OP	1
I	side trim	¾"	1"	10½"	QO	4
J	front/back trim	¾"	1"	34½"	QO	3
K	side slats	½"	4¾"	64¾"	QO	2
L	back slats	½"	3"	64¾"	QO	2
M*	front/back cove trim	½"	¾"	34½"	QO	4
N*	side cove trim	½"	¾"	10½"	QO	4
O*	top	¾"	17½"	44"	EQO	1
P	shelves	¾"	12½"	36⅞"	OP	4
Q	shelf end edging	¾"	¾"	12½"	QO	8
R	shelf front edging	¾"	1¼"	38⅜"	QO	4

*Parts initially cut oversize. See the instructions.

Materials key: QO–quartersawn red oak, OP–red oak plywood, EQO–edge-joined quartersawn red oak.
Supplies: #20 biscuits, #8×1½" flathead wood screws (20), #8×1¼" brass roundhead screws (9), #8 brass flat washers (9), ¼" shelf supports (16).
Blades and bits: Dado-blade set, ¼" brad-point bit, ⅜" cove and 45° chamfer router bits.

4 Easy Oak Finishes

Forget finicky finishes. Try these four techniques to bring out red oak's different personalities.

Attractive finishes don't always have to be difficult. Sometimes, you can get the look you want in a couple of simple steps. To demonstrate these four easy finishes, we tried them on four small, red-oak tables (see Sources on *page 36* for plans). Except where noted, we followed these basic finishing rules:

✔ We sanded all parts to 120 grit prior to finishing, then vacuumed and wiped them free of dust.

✔ Dyes and water-based stains dried for four hours, and oil-based stains dried overnight before we applied any topcoats.

✔ We waited two hours between coats of water-based finishes, and overnight for oil-based finishes before recoating.

✔ Between each topcoat, we scuff-sanded with 320 grit.

Now, let's start with the easiest finish:

1 Pure simplicity

Have we got a no-flaw finish for you: boiled linseed oil followed by wipe-on polyurethane. This combo gives wood pores subtle emphasis, and the surface a natural look that protects the wood against moisture and abrasion. What's more, you'll have no problem finding or applying both of these inexpensive finishes.

Ingredients and application. First, flood the surface with generous amounts of boiled linseed oil. Reapply oil anywhere it's absorbed by the wood, then wipe the surfaces dry. As oil dries, it may bleed from the wood pores and harden on the surface. Wipe away these deposits every hour until you no longer notice them. Allow the project to sit four to seven days while the oil dries.

- **Topcoat:** Mix two parts polyurethane with one part low-odor mineral spirits, and stir. With experience, you can increase the percentage to three parts polyurethane to one part mineral spirits for thicker coats with each application.
- **Topcoat application method:** Use a clean cloth to wipe on this finish. Remove any excess before it runs or puddles.
- **Number of topcoats:** Apply at least three coats.

Speaking from experience. Compared with brushing on straight or lightly thinned poly, this technique avoids a host of problems with dust nibs and brush strokes.

- Take your time. If you rush the first coat of poly before the boiled linseed oil dries, the added mineral spirits will reactivate the oil and cloud the finish.
- Project parts, such as the vertical panels in the table, can be finished before assembly for consistent color.
- This film finish builds slowly, partly because you'll scuff-sand (and wipe clean) the already-thin coats between applications. Then, consider adding two additional coats where needed to protect the project: the top, the outside of the legs, and any surfaces likely to be marred or scratched.
- Cover up minor scratches by lightly scuff-sanding the damaged area and wiping a coat of poly over it.
- As always with boiled linseed oil, lay oil-soaked rags flat on an non-flammable surface to dry before discarding them.

2 A one-step finish with a golden glow

Here's a novel look for accent furnishings, small projects, or part of a larger project. Pearlessence (see Sources), a translucent finish shown *below*, adds a subtle gold sheen that also reduces the contrast between oak's pores and the surrounding wood.

Ingredients and application.

- **Surface preparation:** Sand bare wood to 180 grit for a smooth surface. Wipe the surface with mineral spirits to check for flaws that will be exposed by stains or reflected on a Pearlessence surface.
- **Stain/dye:** Although none was applied here, any shade can be used.
- **Topcoat:** Pearlessence.
- **Topcoat application method:** Brush or spray on both the Pearlessence and any optional clear topcoats.
- **Number of topcoats:** One coat of Pearlessence for color and shimmer. An optional two coats of semi-gloss water-based finish add wear protection.

Speaking from experience. Although it dries as quickly as other water-based film finishes, Pearlessence left few brush marks.

- Stain colors beneath this finish make a big impact on the final color and amount of surface shimmer. Golden oak stain plays up the metallic sheen, as shown *below*, while red oak stain mutes it.
- Stir the coating well before and during application for a consistent sheen.

Pearlessence applied over golden oak stain yields a slightly greenish tint; red oak stain turns a coral shade.

3 Deep and dark, but not difficult

Going just one step beyond a basic stain and topcoat produces an elegant ebony finish. The secret? Start with an application of water-soluble ebony dye followed by a dark oil-based stain. Unlike black paint, this finish still reveals red oak's grain lines as a matte color that contrasts against the smooth surrounding wood.

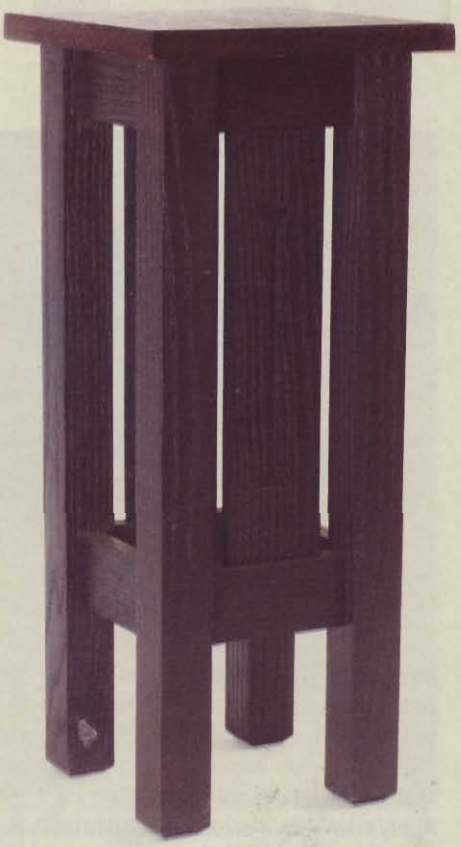
Ingredients and application. Because missed spots stand out against a dark finish, dye, stain, and finish parts before assembly.

- **Surface preparation:** Sand to 150 grit, then raise the grain with a damp towel, and lightly scuff-sand to remove raised nibs. Tape off joint areas before finishing each part for a solid glue bond.
- **Dye:** Mix ebony dye (see Sources, *next page*) at 2 tablespoons of black dye to 6 oz. of water. Generously apply dye using a cloth or sponge brush. Allow the dye to dry, then remove surface dye residue with a clean, dry cloth.
- **Stain:** With a cloth, apply a dark walnut stain in a circular motion to fill the pores. Wipe away excess stain with the grain.
- **Topcoat:** Brush on semi-gloss water-based poly to seal the wood, followed by two topcoats.

Speaking from experience. Vary the dye concentration and choice of stain to customize the color from all black to a medium chocolate color. The dye and stain should be roughly the same degree of darkness for best results.

- The color may seem bland after applying stain over dye. But the film finish will bring it to life and give it depth.

Ebony dye lays the groundwork for a dark finish, but it doesn't fill oak's deep pores. For that, you need a stain with pigment particles.



4 A low-odor choice for indoor finishing

An indoor workshop gives you a welcome retreat from winter—that is until it's time to apply a finish. Your only choices seem to be either wait for warm weather to use solvent-based finishes outside or spread finish fumes throughout your house. You have a third choice, though: water-based stains and film finishes.

Ingredients and application. We used the same materials and technique to finish the display shelf on *page 28* and the table shown at *left*.

- **Stain:** General Finishes Early American water-based stain in semi-gel form.
- **Stain application method:** Wipe stain on with a soft paper towel; then remove it immediately with a clean towel, as shown *below*.
- **Topcoat:** ZAR Ultra Max water-based satin finish.
- **Topcoat application method:** Brush on or spray on with a touch-up sprayer for less overspray than a full-size spray gun.
- **Number of topcoats:** One coat to seal, followed by two topcoats.

Speaking from experience. Water-based stain can be a challenge to apply. Leave it on a few seconds too long, even under ideal conditions, and it quickly dries. Dry air only exacerbates the problem.

- Sanding up to 220 grit reduces blotching. But the smooth surface traps fewer stain pigment particles for a lighter color.
- Work quickly in small areas, but keep overlaps to a minimum to avoid lap marks. Stain long project pieces, like the legs on the display shelf, using generous amounts of stain in long strokes.
- To slightly darken light spots, remoisten the towel used to apply the stain, and gently wipe the light section until it matches the surrounding area.
- To remove dried excess stain, make a couple of passes with a moistened coarse cloth, such as burlap, as shown *below*, until the color evens out.
- Take care when staining projects that mix veneer plywood and solid oak. The plywood may require additional stain applications because it absorbs less stain, producing a lighter color.
- Should the stain raise the grain slightly, make three light passes over the stained areas using 320-grit abrasive. Do not sand through the stain.
- Water-based finish dries quickly, even inside a spray gun. Clean spray equipment between coats to prevent finish from clogging the sprayer.

Apply stain with a circular motion to work pigments into the pores. Then wipe with the grain and remove any surplus.

A moistened, coarse cloth can be used to remove dried deposits of water-based stain. Then, re-stain for an even color.

Sources

Stains: Early American water-based stain, call General Finishes at 800/783-6050, or visit generalfinishes.com. Dark walnut (No. 269) oil-based stain, call Varathane at 800/635-3286, or visit varathane.com.
TransTint black dye: No. 128490 from Woodcraft, $17 for 2 oz. Call 800/225-1153 or visit woodcraft.com.
ZAR Ultra Max water-based satin finish: United Gilsonite Laboratories, call 800/272-3235 or visit ugl.com.
Olympic Pearlessence: PPG Architectural Finishes, call 866/321-9090 or visit olympic.com. (Available at Lowe's stores nationwide.)
Table plans: The tables used to demonstrate our finishes are modified versions of the smallest of a set of three mission nesting tables, plan No. DP-00015. To order, go to woodmagazine.com/nesttables.

Make Smoothing Wood Just Plane Simple

Sand less by tackling tricky wood grains with a scraping plane.

Watch a FREE 4-minute video on sharpening scraping planes at: **woodmagazine.com/videos**

Before sandpaper, craftsmen turned to a scraper when they needed a silky-smooth surface. Today, scrapers still work wonders for taming wild wood grain, and provide you with a welcome break from the noise and dust of sanding.

Unlike handheld card scrapers, a scraping plane requires less effort, especially on large surfaces, and holds the blade at a consistent angle. (It also costs 10–20 times more than a $10 card scraper.)

First, burnish the blade

As with any bench plane, clean cuts depend on a sharp blade, so sharpen a scraping plane blade as you would a conventional plane blade. (See *WOOD* magazine issue 160 [December/January 2004/2005], page 54, for a sharpening system using waterstones. Or you can download the article for $3.00 at woodmagazine.com/sharpen.) As you would with a conventional blade, slightly round over the ends of the bevel to keep the blade from leaving marks with each pass.

Next, form a burr on this sharpened edge. To do this, make a burnisher guide block from a 2"-thick scrap about 6" long and ½" wider than the plane blade. Bevel-cut one end at 15° or the angle specified for your plane, as shown on *page 39, top right.* Clamp the guide block and blade in a

Adjustment screws fine-tune the angle of the blade. Tighten the blade bow thumbscrew to create a slight concave in thin blades to help eliminate edge marks.

vise—the blade can be on either side of the block—with the bevels facing the same way and the blade about 1/64" proud of the block.

With the block as your angle guide, use a burnisher (see Sources) or the hardened shaft of a screwdriver or chisel to roll the burr. Press firmly as you push or pull the burnisher from the center to one edge while simultaneously sliding it diagonally, as shown at *right, top*. Then slide the burnisher from the center to the opposite edge. Repeat until you feel an even burr form as the sharp edge rolls over.

Install and adjust the blade

A properly burred and installed scraping blade should remove a paper-thin shaving. To install the blade, first place two pieces of typing paper about 2" apart on a flat wooden surface such as your workbench. Then rest the sole of the plane on the papers with the opening in the sole (called the "throat") between them, as shown at *right, center*. Adjust the frog angle until it's about 80° to the sole. Open the lever cap knob far enough to insert the blade with the burr facing forward (avoid dinging the burr against the plane body) and resting on the benchtop. Then tighten the lever cap knob.

For a shallower cut, use just one piece of paper beneath half the plane sole. For the shallowest cut, place the sole directly on the benchtop and press down on the blade while tightening the lever cap knob.

Now test your scraping plane on a piece of scrap clamped firmly in place, but don't be surprised if nothing happens. To peel off an even curl of wood, the frog must be adjusted to an angle where the burr snags the wood as you begin to work the plane.

The blade changes depth as you change the frog angle, so first loosen the lever cap knob just enough to free the blade. Then back away the two frog adjustment wheels by about 1/8". After you secure the frog, retighten the lever cap knob to reset the blade depth. Repeat this process until you feel the blade bite into the wood and shave thin curls of wood from your scrap. (See "Shavings tell how you're scraping by.")

Using a scraping plane

Scraping planes work slowly by taking thin curls, so start with a surface flattened with a power planer or hand plane. As when using a smoothing plane, grip the scraping plane firmly by the front knob and rear handle, as shown at *lower right*.

Working in the direction of the grain, hold the plane with the blade off the work surface and the toe firmly pressed against it. Push firmly against the rear handle hard enough to begin cutting and build momentum to complete the stroke. For hard or difficult woods, such as quilted maple, start the cut while holding the plane at roughly a 25° angle to the grain for a shearing motion.

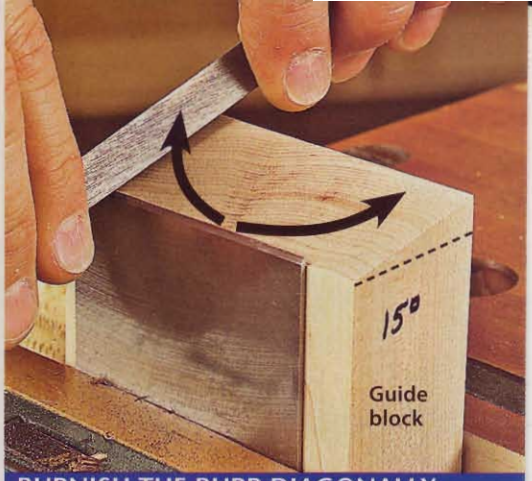
Equalize your hand pressure on the toe and heel by midcut. At the opposite end of the workpiece, shift pressure to the heel as the blade nears the edge. That reduces the chance of rounding over the work surface.

Plan the next stroke to slightly overlap the previous one. Test your work periodically by wiping the surface with mineral spirits to reveal any plane marks. If you notice any, reduce the depth of cut, round over the blade edges, or use the blade bow thumbscrew to eliminate the problem.

Sources

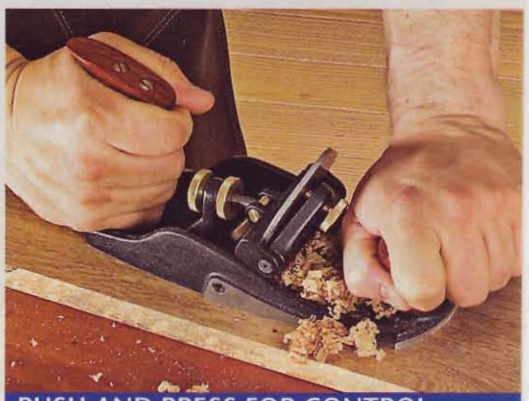
Scraping planes. No. 85 Cabinet Makers Scraper, $195. Lie-Nielsen Toolworks, 800/327-2520 or lie-nielsen.com. Kunz No. 112 Scraping Plane (no. 16X61), $90. Woodcraft, 800/225-1153 or woodcraft.com. Veritas Scraping Plane (05P29.01), $149. Lee Valley Tools, 800/871-8158 or leevalley.com

Triangular burnisher. Two Cherries triangular burnisher (520-5085), $18. Di Legno Workshop Supply, 877/208-4298 or dlws.com

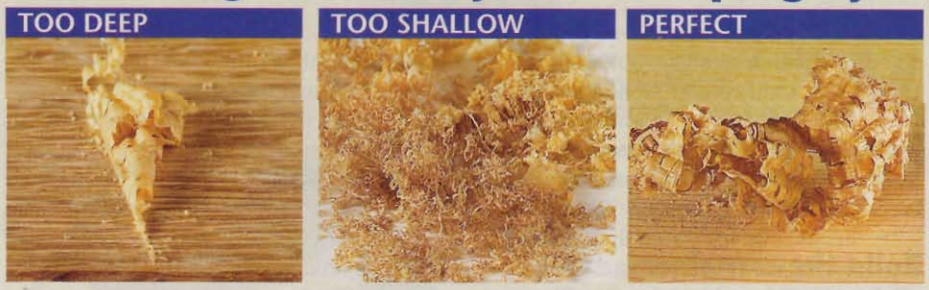


BURNISH THE BURR DIAGONALLY

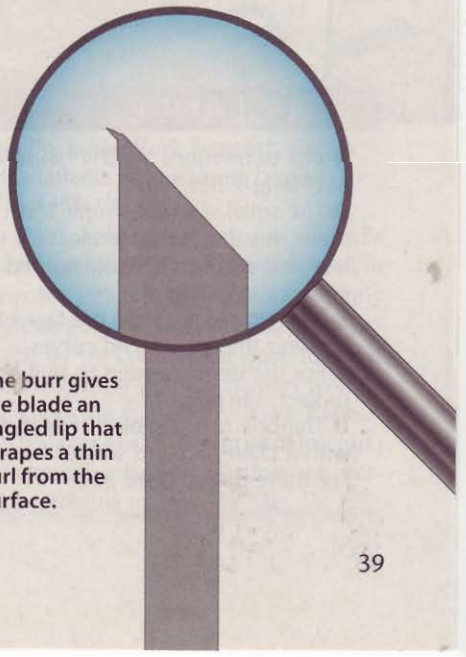
SET FOR PAPER-THIN SHAVINGS


PUSH AND PRESS FOR CONTROL

Shavings tell how you're scraping by



Examine the wood and your plane shavings to diagnose problems. If the blade cuts too deeply, as shown *above left*, loosen the lever cap knob and reduce the blade depth. If a freshly sharpened blade still leaves just tiny curls and sawdust, as shown *above center*, adjust the pitch of the frog until the burr bites into the wood surface. If a worn blade goes from making curls to making sawdust, resharpen the blade and restore the burr. Aim for long, wide, and thin shavings, like the one shown *above right*.


The burr gives the blade an angled lip that scrapes a thin curl from the surface.

Pagoda Box

in contrasting woods

Watch a FREE 5-minute video on Forming the Pagoda Box Lid at: woodmagazine.com/videos

AT A GLANCE

- *Box dimensions are 5¼" wide × 6½" long × 5⅜" high.*
- The small size and simple form make this the perfect project for hoarded cutoffs of highly figured and exotic woods.
- Two simple jigs ease the task of forming the graceful lid curves.
- For the items needed to build this project, see *page 44*.
- The box *above* is bird's-eye maple with a cherry lid and walnut handle. For more options, see *page 44*.

With a design rooted in Asian architectural style and form, Bellingham, Washington, woodworker David Selditz pays homage to beauty through simplicity. To find out more about David and his work, see *page 44*.

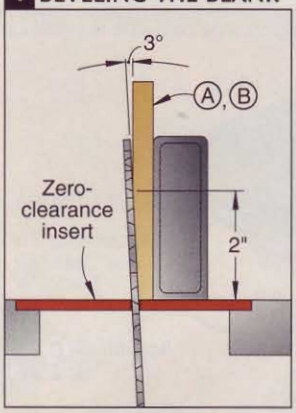
Build the container

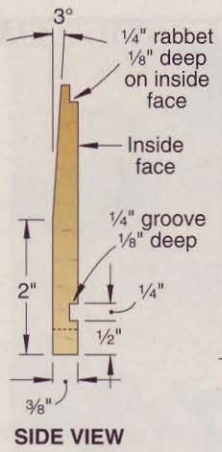
1 For the sides (A) and ends (B), plane stock to ⅜" thick, and cut a 4×20" blank. Then set up your tablesaw [**Drawing 1**], and bevel the top half of the blank [**Photo A**]. Now cut a rabbet and a groove on the inside face [**Drawing 2**, **Side View**]. Sand the bevel smooth, and then finish-sand the inside face of the blank and the rabbet.

2 To make the wood grain wrap continuously around the container, cut the sides (A) and ends (B) ⅛" longer than listed [**Materials List** on *page 44*], and cut them from the blank in the sequence A-B-A-B. Mark the order on each part. Then miter the parts to finished length. Now lay out the arches [**Drawing 2**], and bandsaw and sand them to shape.

3 Cut the bottom and lid base (C) to size. Then set the lid base aside, and dry-assemble the container to check the fit of the

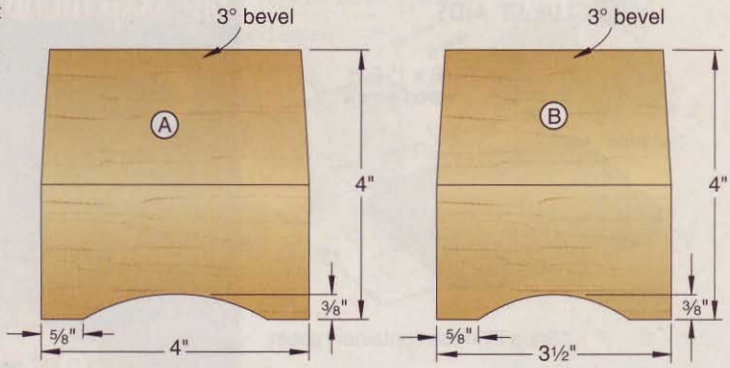
1 BEVELING THE BLANK



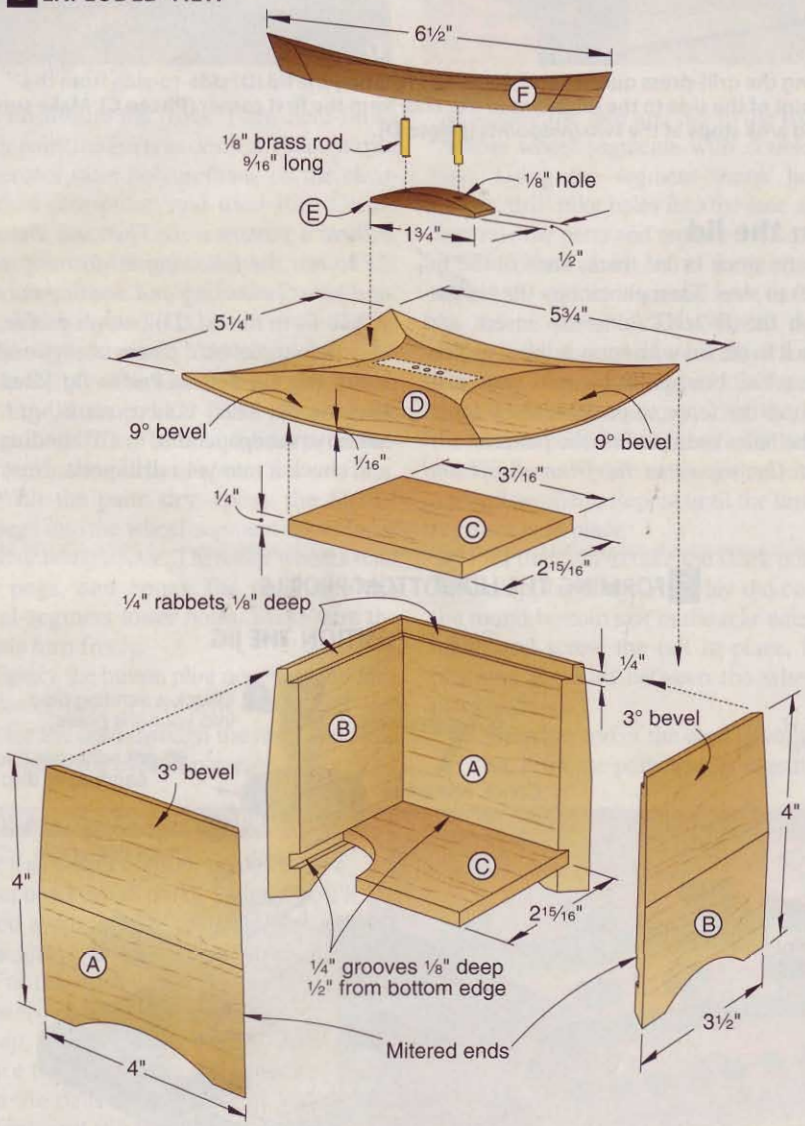


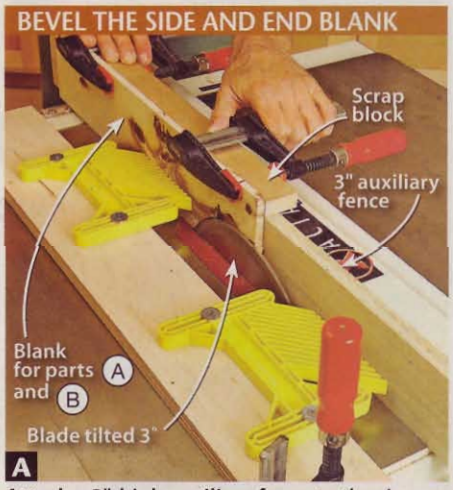
SIDE VIEW

2 SIDE AND END (2 of each needed)

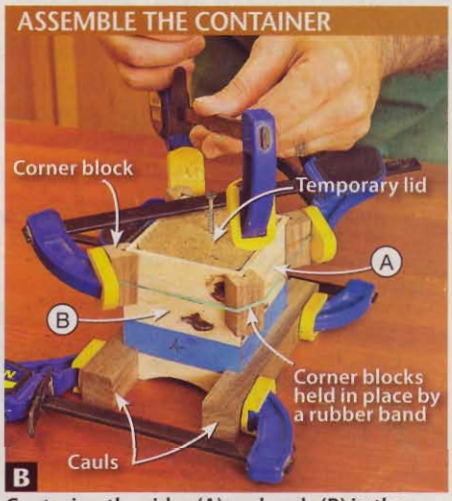


3 EXPLODED VIEW





Attach a 3"-high auxiliary fence to the rip fence. Clamp a scrap block to the blank so it rides on the auxiliary fence. Cut the bevel.

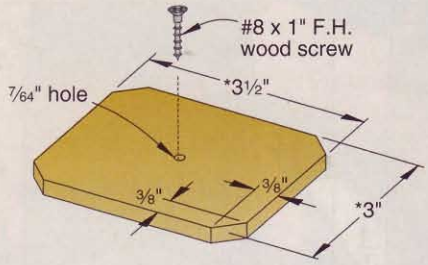


Capturing the sides (A) and ends (B) in the caul notches and with corner blocks, glue and clamp the container.

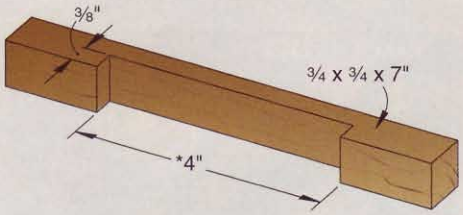
parts [**Drawing 3**]. To keep the top of the container square during glue-up, cut a temporary lid from ¼" hardboard to fit snugly into the top rabbet. Chamfer the corners to prevent excess glue from bonding it in place [**Drawing 4**]. For easy removal after glue-up, drive a wood screw into the center.

4 To make clamping the container during glue-up easier, cut three ¾×¾×7" pieces of scrap. Then notch two of the pieces for cauls, and make corner blocks with the remaining piece [**Drawing 4**]. Now glue and clamp the container [**Photo B**]. Do not glue the bottom (C) into the side (A) and end (B) grooves. With the glue dry, finish-sand the outside of the container.

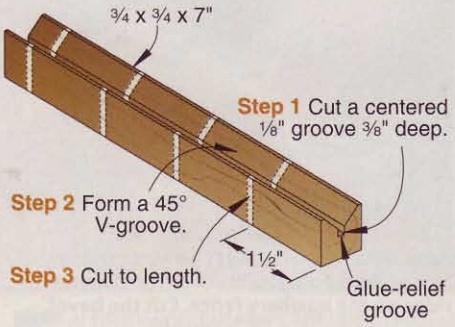
4 GLUE-UP AIDS



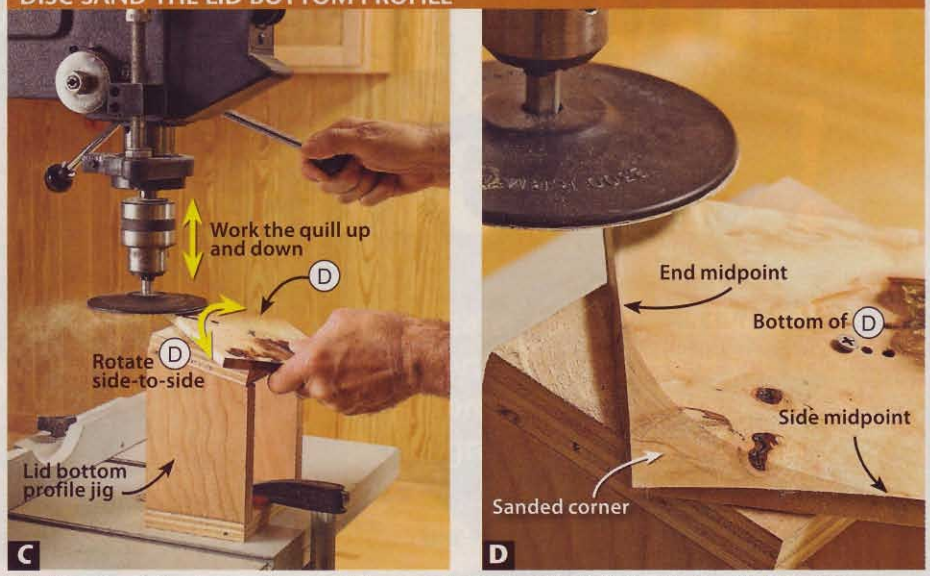
*Snug fit in the container rabbet



*Exact length of (A)



DISC-SAND THE LID BOTTOM PROFILE



Working the drill-press quill up and down and rotating the lid (D) side-to-side from the midpoint of the side to the midpoint of the end, form the first corner [Photo C]. Make sure the sanded area stops at the two midpoints [Photo D].

Form the lid

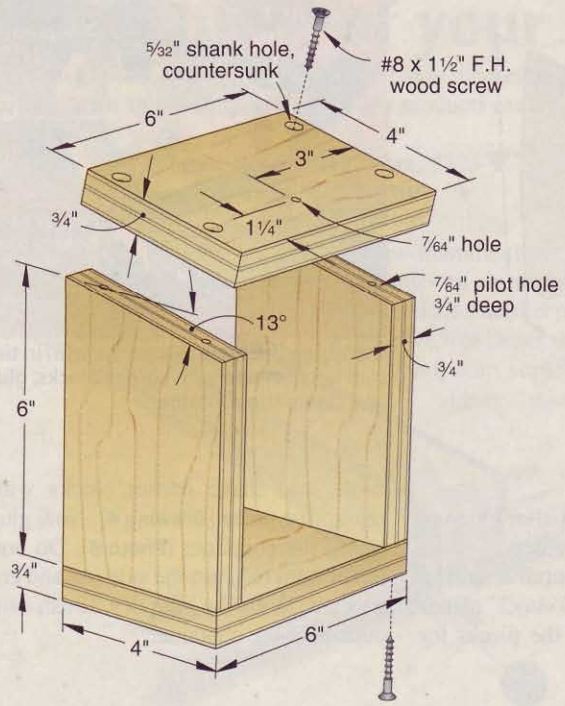
1 Plane stock to 3/8" thick, and cut the lid (D) to size. Then photocopy the **Lid Pattern** on the *WOOD Patterns®* insert, and adhere it to the lid with spray adhesive. Now chuck a 9/64" brad-point bit into your drill press, use the fence to position the lid, and drill the holes indicated on the pattern.

Note: *Cut an extra lid from scrap and adhere a pattern to it. Then use this scrap lid to test the following lid-forming setups and practice making and sanding the cuts.*

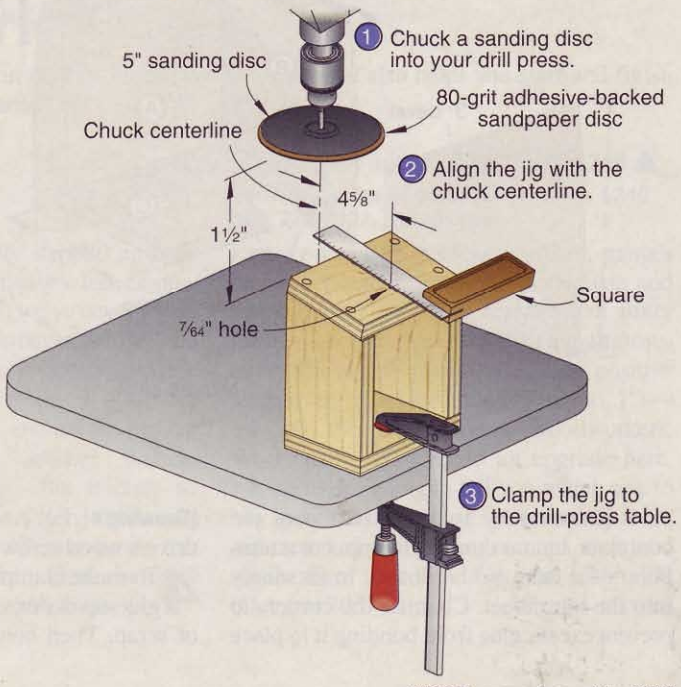
2 To form the lid (D) bottom profile, first cut four 3/4x4x6" pieces of plywood, and make the **Lid Bottom Profile Jig** [**Step 1** of **Drawing 5**]. Then adhere an 80-grit self-adhesive sandpaper disc to a 5" sanding disc, and chuck it into your drill press. Next posi-

5 FORMING THE LID BOTTOM PROFILE

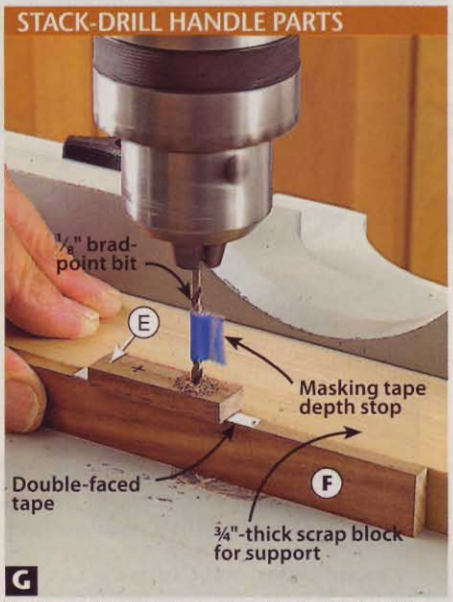
Step 1 BUILD THE JIG



Step 2 POSITION THE JIG



Position the lid (D) snug against the jig stop and the bandsaw table and screw it in place. Then bandsaw the scallop to the dashed pattern line [**Photo E**]. Now with the lid still attached to the jig, drum-sand the scallop to the solid pattern line [**Photo F**].



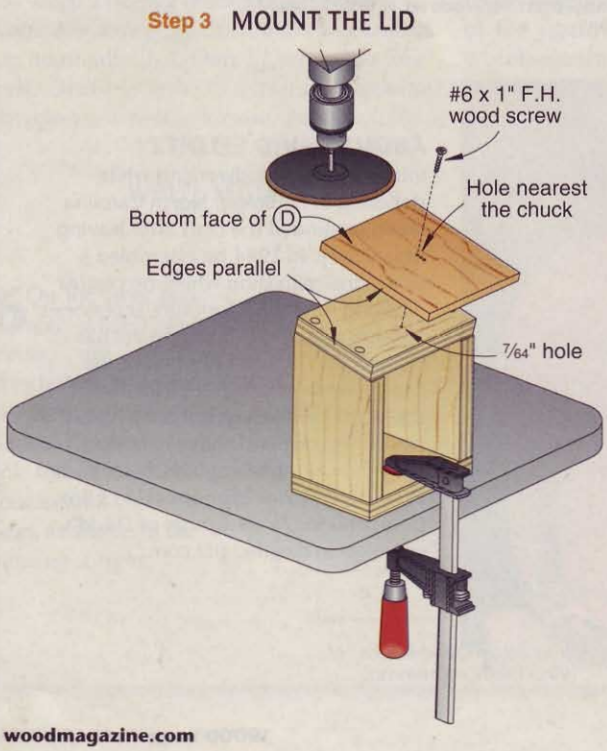
With double-faced tape, adhere the handle base (E) to the handle (F), centered side-to-side and end to end. Drill ½"-deep holes.

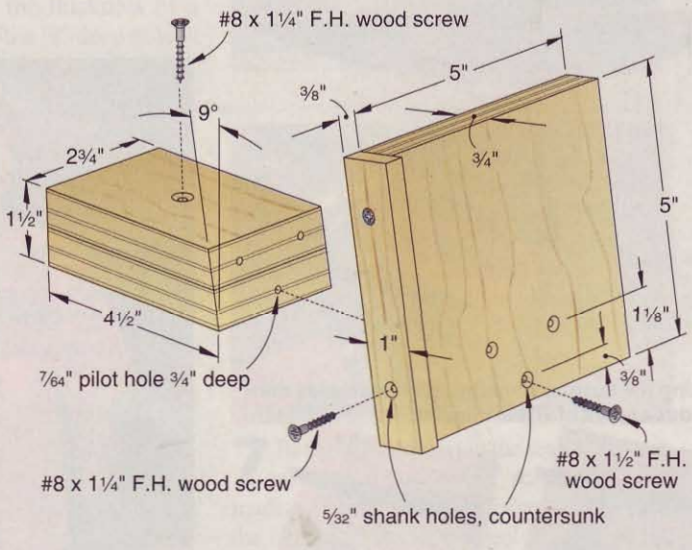
tion the jig on your drill press, and clamp it to the table [**Step 2**]. Now fasten the lid to the jig with a wood screw [**Step 3**].

3 Lower the drill-press quill until the sandpaper just kisses the upper edge of the lid, and set the depth stop to this position. Then raise the quill and rotate the lid, pointing one corner to the center of the chuck. Now form the first corner [**Photos C and D**], and then the second corner. Remove the lid, rotate it so the other end faces the chuck, screw it to the jig, and sand the other two corners. Finish-sand the bottom profile.

4 To form the lid (D) top profile, first cut two ¾×2¾×4½" pieces and one ¾×5×5" piece of plywood and one ⅜×1×5" piece of solid stock, and assemble the **Lid Top Profile Jig** [**Drawing 6**]. Then screw the lid to the jig, and rough-cut the first scallop to the dashed pattern line [**Photo E**]. Switch to a spindle sander, and sand to the solid line [**Photo F**]. Repeat for the other three scallops. Finish-sand the top profile.

5 Retrieve the lid base (C) and finish-sand the bottom, ends, and edges. Glue and clamp the lid base, centered, to the bottom of the lid (D).





PAGODA BOX GALLERY

You can mix or match wood species for the box, lid, and handle in almost endless combinations. Here are a few examples.

Leopard wood body with a bubinga lid and wenge handle

Hickory with bark inclusions body and a walnut handle (To learn how to harvest unique wood like this, see *page 46*.)

Bird's-eye maple body with a bubinga lid and wenge handle

Making the bottom from the same species as the lid adds a spark of visual interest.

Make the handle

1 For the handle base (E) and handle (F), rip a ¼"-wide strip from the edge of a ¾"-thick, 12"-long piece of stock. Then cut the parts to size. Mark hole centers on the bottom of the handle base [**Handle Base Pattern**]. Now chuck a ⅛" brad-point bit into your drill press, and stack-drill holes for brass rods in both parts [**Drawing 3** and **Photo G**]. Mark the orientation of the two parts for reassembly, and separate them.

2 Photocopy the **Handle Base Pattern** and **Handle Pattern** on the insert, and adhere them to the parts with spray adhesive. Bandsaw and sand the parts to shape, and then finish-sand them. Glue and clamp the handle base (E) to the lid (D), centered [**Drawing 3**].

Finish and add the handle

1 Examine all the parts, and finish-sand where needed. Then apply a clear finish. (The figured woods we used needed no stain. We simply applied several coats of aerosol lacquer, sanding with 320-grit sandpaper between coats.)

2 With the finish dry, cut two pieces of ⅛" brass rod to length, and polish them with 0000 steel wool. Then place a small drop of epoxy into the handle base (E) and handle (F) holes, insert the brass rods into the base holes, and press the handle onto the protruding rods. (There should be a 1/16–⅛" gap between the handle base and handle.) Make sure the handle is level relative to the lid. Now stow your small treasures in the box, and place it where all can admire.

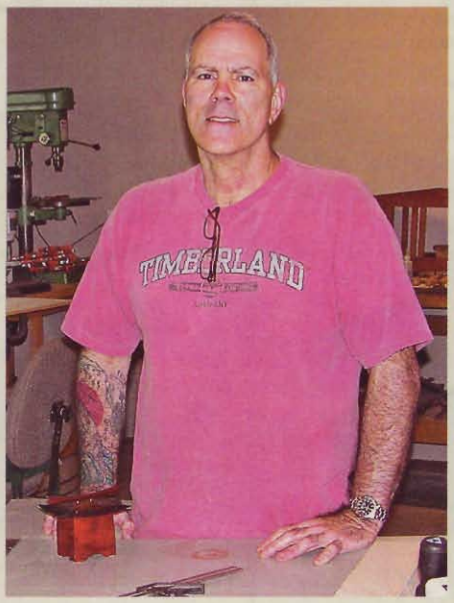
Written by **Jan Svec** with **Chuck Hedlund**
Project design: **David Selditz**
Illustrations: **Roxanne LeMoine**

Materials List

Part		FINISHED SIZE T	W	L	Matl.	Qty.
A*	sides	⅜"	4"	4"	BM	2
B*	ends	⅜"	4"	3½"	BM	2
C	bottom and lid base	¼"	2 15/16"	3 7/16"	C	2
D	lid	⅜"	5¼"	5¾"	C	1
E*	handle base	¼"	½"	1¾"	W	1
F*	handle	¼"	¾"	6½"	W	1

*Parts initially cut oversize. See the instructions.

Materials key: BM–bird's-eye maple, C–cherry, W–walnut.
Supplies: Spray adhesive; double-faced tape; ⅛" brass rod; epoxy; #8×1", #8×1¼", #8×1½", #6×1" flathead wood screws.
Blades and bits: Stack dado set, ⅛" and 9/64" brad-point drill bits.



ABOUT DAVID SELDITZ

Introduced to woodworking while stationed at Ft. Bragg, North Carolina, David continued the craft after leaving the military. In 1994 he assembled a small, one-man shop where he creates gifts and functional furniture accessories. Though primarily self-taught, he has studied the methods of some of the finest woodworkers in the Northwest. David's style is recognizable by his artful blend of exotic and native hardwoods. In 1999, he won the People's Choice Award in Northwest Fine Woodworking's Box Competition. To view more of David's work, go to davidselditz.com.

Find Your Own Wood, Save a Bundle

Your backyard may be your best source for FREE stock.

Using his simple resaw jig, Brian Hahn slices into a small walnut crotch, exposing the highly figured wood within.

Bitternut hickory found wood adds drama to this pagoda box design .

According to the U.S. Department of Agriculture, some 3–4 billion board feet of lumber end up in landfills each year. While money may not grow on trees, knowing how to salvage a fraction of that "green waste" is as good as putting some green into your pocket. To show you how you can start "shopping" for logs right in your own backyard or local forests, we asked longtime woodworker and small-shop sawyer Brian Hahn, from Avoca, Wisconsin, to share his favorite jigs and techniques for converting firewood into valuable stock. Here, you'll learn how to select, saw, and store boards, turning blanks, and small logs. We even came up with a great small project for you to build (see *page 40* for the box *above*) as you experiment with your newfound wood.

Granted, you may want to stick with your favorite mill when you need long boards for a big project. But once you experience the thrill of finding a new species, or sawing open a spectacularly figured log, odds are good that you will never look at your firewood pile the same way again.

HARVESTING OPTIONS

Before firing up your chainsaw, take a minute to compare the advantages of sawing your own versus buying stock from your local mill or home center. Transforming logs into lumber can be slow work, but the results can be more than worth a little extra effort.

Reasons to saw your own:

■ **Savings.** Odds are you already have most of the tools you need to harvest free wood. (See "Sawyer Starter Set," *above right.*) Realize that a logger's credentials are not required to find plenty of sawable stock. New construction, old age, disease, and storms claim thousand of trees each year; sawing makes the best use of this (often free) available material... yielding spectacular stock that's impossible to buy at any price.

■ **Selection.** Because of their small trunk size or limited quantities, many outstanding local woods are considered "noncommerical" by big mills. (To view a small sample of what you might find depending on your area, check out the samples on *page 50.*)

SAWYER STARTER SET

If you own a 14" bandsaw, you're set to start sawing. Invest in some of the tools shown here to make the job easier and safer.

1. **Electric chainsaw** Perfect for making quick cuts, without gas or fumes.
2. **Metal detector** Nails happen. A detector defends your blade from all sorts of metal debris.
3. **Plastic wedges** Use to hold open chainsawn kerfs. Won't damage blade if nicked.
4. **Moisture meter** Digital display tells you when home-sawn stock is dry enough to start working.
5. **Ear muffs** Sawing is loud and dusty work. Protect yourself.
6. **Sledgehammer and wedges** The traditional approach to splitting large logs.
7. **Handheld power planer** Simple flattening solution, especially for logs that might be too wide for your jointer.
8. **Pallet** An ideal saw bench. The slats hold round logs and keep the chainsaw's blade safely above the floor. Watch out for nails in the pallet, though!

■ **Surprise and satisfaction.** Cutting into a newfound log is like opening a treasure chest, with no two logs alike. Using wood from a special tree on your property to make a gift or keepsake is a wonderful way to hold on to and share a bit of family history.

Reasons why you might stick with your sawyer:

■ **Waste.** At a commercial mill, about a third of a "good" log is waste. As you experiment with burl, crotch, and root stock (See "Where to Find Good Wood," *next page*, you may uncover some fabulous figure, but your percentage of waste is likely to be even higher. (However, if you use a fireplace or woodstove, bark, chips, and unusable stock easily can be converted into free heat.) If you're more interested in woodworking than wood-finding, you might be better off sticking with prepared boards and blanks.

■ **Weight.** If you've stacked firewood, you already know that a freshly sawn 2' long by 10" diameter log can weigh in at 40–80 pounds. To save your back, set a length limit, and use your chainsaw to split large logs into more manageable chunks. This also makes for a safer operation.

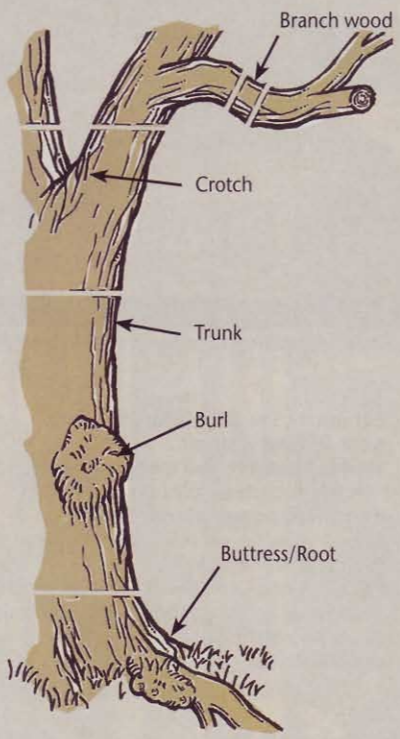
■ **Wait.** Freshly sawn stock needs time to dry; otherwise it will warp and crack. Without a kiln, it takes approximately 60–90 days to air-dry stock to 20 percent moisture content (MC). At that point, you'll need to move your wood indoors so it can continue losing moisture. To achieve 8–10 percent MC—the level where indoor projects won't split or crack—the "year per inch of thickness" rule is a safe bet.

On the other hand, blanks are suitable for turning right away. To cut drying time in half, some turners partially turn green blanks (for a 10" bowl, leave the sides about 1" thick), and then store the unfinished projects in paper bags. As the rough-turned bowls dry they may warp, but are less likely to crack. When a rough-turned bowl reaches 12 percent MC, it's dry enough for final turning.

■ **Warehousing.** Extra wood needs extra space. Ideally, green wood should be left in an unheated, but protected space (a tarp can work in a pinch, but a shed is best) so that it can slowly release stored moisture. (Outside storage also keeps bugs, excess humidity, and dirt away from the rest of your shop.) If you have a small workshop, you may not be able to afford space for stickered piles, shelves of drying blanks, or sealed-but-yet-unsawn logs.

Where to Find Good Wood

Knowing where to explore for choice wood is as important as knowing the type of tree it's from. Use this sketch as a guide to estimate the potential value of new-found wood. Of course, there always are exceptions to the rules. When in doubt, make a test and see for yourself. Use a power planer to smooth the rough-sawn surface and examine the grain.



Branch wood. Use with caution or avoid altogether. In addition to some figure, branches contain reaction wood that leads to excessive movement and splitting. When cut, the released stress can cause the wood to close and grab a blade in mid-cut, stop your bandsaw in its tracks, or break the blade.

Crotch. Cut across the "V" to reveal the highly figured grain pattern within. Paint the end and the feathery face grain with latex paint or wood sealer, such as Anchorseal (see Sources on *page 52*), to control checking.

Trunk. If you're lucky, you might discover some curly or bird's-eye stock, but regular clear, straight stock is perfect for all sorts of projects. Inspect stock carefully for nails, screws, or other debris that can damage your saw blade.

Burls. Spectacular wild grain—just don't saw them off a living tree! Root burls tend to grow bigger, but aerial burls are finer-grained and better proportioned. Seal cut areas immediately to guard against checking and cracking.

Buttress/Root. Here, the dirt and rocks will dull your saw teeth, but the highly figured wood is worth the risk. Don't discount stumps; good wood can be found below ground level.

FROM PROMISING LOGS TO IMPRESSIVE BOARDS

Over the years, Brian has developed a simple four-step sequence for sawing stock. By combining your bandsaw and a fresh 2–3 tpi, ¾" blade (see Sources on *page 52*) with his techniques and ripping jig, you'll be able to start turning logs into usable stock right away.

Step 1: Start with fresh logs.

Like most sawyers, Brian prefers starting with fresh-cut logs rather than old firewood or dead standing trees. "Unless they're protected, logs degrade rapidly, sometimes within a week," he says. Brian seals the ends immediately after using his chainsaw to protect the boards and blanks within the log. The sealer not only prevents checks and cracks that occur when a log loses moisture too quickly it also keeps out bugs and other wood-eating organisms that can stain or otherwise damage the wood. At this point, logs can be safely stored, although they dry much more slowly than sawn stock.

Sometimes, a sealed log will start to crack. Before brushing on a second coat of sealer, Brian saws about 6" off the offending end and continues cutting until he reaches solid wood before sealing. "Considering all the work that's involved, there's no point in trying to save split wood," he says.

Leave tree felling to the pros!

Without proper training or experience, the chance that you might get hurt or damage nearby property isn't worth the risk. Similarly, if you're intent on sawing long logs, call for help. Woodmizer (800/553-0182) or Timberking (800/942-4406) can provide you with names of sawyers in your area who operate stationary and portable sawmills.

Step 2: Split to save stock and make massive logs manageable.

Whether you're sawing boards or blanks, in most cases you'll want to remove the pith, or core, of the log. "Since cracks start from the pith, cutting it out saves a lot of stock," says Brian. As an important side benefit, splitting reduces the weight of big logs and shrinks the diameter. This will enable you to maneuver bigger logs on your bandsaw.

Brian uses a chainsaw to cut large-diameter logs down to size before bringing them into this shop. To do this, he first positions the log on a pallet and crosscuts it to length. Next, he lifts the log onto his saw bench, as shown [**Photo A,** *opposite*]. For large logs, Brian makes a chalk line on one side of the pith and saws the log along its length, as shown. (Alternately, you can split larger logs using the wedge-and-mallet approach.) After sawing, Brian uses a handheld power planer to smooth out the rough cut left by the chainsaw.

When working with smaller logs or crotch stock, you'll want to use the bandsaw resawing jig (modified from on Brian's design) to make your first cut. (See the building instructions for this jig on *page 90*. Also see the online video showing how to use this jig at woodmagazine.com/videos.) Use a combination of screws and small wedges to fasten the log to the jig's fence. Once the log is fastened, reattach the fence assembly to the base, and then pivot and slide the fence as necessary so that the blade slices through, or just to one side of the pith, as shown on *page 46*.

WARNING: Never cut round stock freehand! If a log isn't supported properly, it will shift or roll in mid-cut. This can cause blade damage, injury to yourself, or both.

Step 3: Resaw on your bandsaw.

After establishing a flat face, Brian disassembles the base from his resawing jig. As shown [**Photo B**], he uses the base as a sliding table. To do this, he drives screws through the underside of the base into his log so that one edge hangs over the blade side of the base. Then he fits the runner into the bandsaw's miter slot and makes the cut.

After Brian established two adjoining square faces, start standard resawing. To do this, Brian clamps the jig's fence to his bandsaw, as shown [**Photo C**]. The tall fence provides extra support for wide boards.

When resawing, always allow extra wood (up to ¼") for warping. To minimize warping or cracking, the Forest Products Laboratory recommends slicing green stock into rough-cut boards no thinner than ¾" and no thicker than 2". Wood within that range is thick enough to resist warping, but thin enough to lose moisture without cracking.

Step 4: Stack, seal, and wait.

Green lumber begins to move immediately after sawing. To prevent this, Brian carefully stacks sawn boards in layers, uses ¾" × 1" stickers at 12–18" intervals to provide support and encourage circulation, and weighs down the stack with sandbags, as shown [**Photo D**]. At this point, all that's left to do is watch and wait. You can use a moisture meter to track your stock's progress, or follow Brian's simple

SHOP TIP

Some bandsaw blades may drift, or cut in a line that's not perpendicular to the front edge of your saw's table. If your saw doesn't want to cut straight, the easiest way to compensate for this is to find the angle, and adjust your fence accordingly.

QUICK TAKES ON CREATING AWESOME STOCK

A

B

C

D

rule of thumb: "Cracking means it's drying out too quickly; mold growth means that it's drying too slowly. After six months or so in the storage shed, I bring it into my shop to equilibrate with the inside moisture levels." Brian uses a small electric fan and a tarp to adjust drying times.

Log-to-Lumber Resaw Jig

Brian's bandsaw resawing jig is actually three jigs in one, and can be built from scrap sheet goods found around the shop. Depending on his resawing needs, the jig can serve as a sliding table, an adjustable sawing support for safely slicing round or uneven stock, or a rock-solid resaw fence.

Brian built his jig with materials he had on hand, but he suggests using plywood instead of particleboard, "to add extra rigidity and to make the jig tough enough to survive a few accidental falls and jolts."

Brian designed his jig to work with a 14" bandsaw equipped with a 6" riser block. If you have a smaller saw, adjust the height of the jig's fence to fit, but keep the width and length of the base to ensure stability.

When you're resawing long logs, make sure to set up roller stands, or another type of support system, on the infeed and outfeed sides of your bandsaw. Otherwise, your jig and log may come crashing down as you finish making your cut.

A CHAINSAW RIPPING STATION
After screwing the log to the arm so that it can't shift in mid-cut, Brian saws through the log about 1" away from the center so that one half is already pith-free. Holding the saw at a 30° angle, as shown, seems to produce smaller, less clog-causing chips.

B SLIDING TABLE SIMPLIFIES FIRST SLICE
The sliding table helps guide and slide the log past the blade, even if your first cut isn't perfect. Use screws and small wedges to secure the stock to the sliding base.

C GOOD FENCES MAKE GOOD SLABS
Disassemble your jig and clamp the fence to the table, as shown. Note that you may need to angle it to allow for blade drift.

D SEAL AND STORE YOUR NEW STOCK
Sealing sawn porous ends (and the faces of turning blanks) limits splitting and cracking by promoting even drying. Aligning the stickers vertically transfers the weight of the wood evenly through the pile and encourages stock to dry straight.

Wood You Might Find in Your Own Backyard

When it comes to selection, most backyards and surrounding woodlands beat the average lumberyard hands down. Some of these "noncommercial" woods can be challenging to work with, but the color and figure make them worth the effort. Here are a few samples of what you might encounter:

Softer hardwoods and harder softwoods

Aromatic cedar *Juniperus virginiana*
Found: Eastern/Central U.S.
Somewhat brittle, this stable, aromatic wood is good for box bottoms and drawer liners.

Butternut *Juglans cinera*
Found: All over
Softer, lighter, faster-drying cousin to walnut. Perfect for turnings, carvings, small projects.

Catalpa *Catalpa speciosa*
Found: All over
Wood from this "urban shade tree" works like pine, but without the resin.

Red Pine *Pinus resinosa*
Found: Eastern U.S.
Used for trim, flooring, and windows, this hard, striped softwood adds color to simple projects.

Medium-hard hardwoods

Riverbirch *Betula nigra*
Found: East/Pacific N.W.
Once used for toys, this lightweight wood is easy to work with power and hand tools.

Mountain Ash *Sorbus aucuparia*
Found: Eastern/Central U.S.
The cream-colored wood from this ornamental works for turning, carving, and small projects.

Mulberry *Morus rubra*
Found: All over
Close-grained wood gradually shifts from yellow to purple-brown. Takes a high polish.

Willow *Salix nigra*
Found: All over
The lightweight wood is a favorite of turners, carvers, and box makers.

Hard-to-work hardwoods (but worth it)

Apple *Malis pumila*
Found: Orchards all over the U.S.
Wide boards tend to crack and warp, but this hard, heavy wood turns and carves well.

Bitternut Hickory *Caya glabra*
Found: Eastern/Central U.S.
The white wood is super hard. Toughen softer spalted spots with Minwax's Wood Hardener.

Bur Oak *Querus macrocarpa*
Found: All over
A dead ringer for white oak; you'll want to sand or scrape the wild grain to avoid tear-out. This sample shows curly figure.

Dogwood *Cornus florida*
Found: All over
This hard wood gets smoother with use, making it perfect for mallets and handles.

BUILD A BANK OF TURNING BLANKS

Transforming a log into turning stock requires less work (and less wait) than turning it into lumber. In fact, starting with a chunk of wood, you can fire up your chainsaw, shift over to your bandsaw, and then start turning at your lathe, all in the same day. "Why wait around for wood you don't want? Rough-turning, or at least bandsawing out blanks, speeds up the drying process," says Brian.

To ready wood for the lathe, Brian first uses his chainsaw or bandsaw to make his first big slices; then he sizes the blanks with a homemade layout template, shown *near right*. The clear acrylic makes it easy to find the best potential blank and still see the color and grain of the wood. Using holes in the template, Brian establishes the radius and centerpoint, and transfers the radius to the blank with a compass.

Once drawn, it's time to bring the blank back to the bandsaw. Brian points out that his ¾"-wide blade is great for resawing, but cannot make the tight turns necessary to saw out his blanks. Instead of switching to a narrower blade, Brian makes several straight cuts, "nibbling" up to his line (photo *far right*). "This method isn't perfect, but it saves time by keeping the saw set up for resawing," he says. "Besides, it's easy enough to true-up a blank at the lathe."

Realize that the orientation of your blank within the log plays an equally big part in the appearance of your finished project, *right*. However, when it comes to burls, roots, and multi-pithed crotches, Brian warns that all bets are off. "Letting the blank tell you how it's supposed to be turned is part of what makes turning so exciting," he says.

Once sawn, the blank is ready to turn. If you haven't tried turning green wood, you're in for a pleasant surprise. Many turners prefer local wood for fresh blanks, instead of buying kiln-dried, for reasons other than price. Green blanks are softer and easier to turn than dry stock; this means that chisels and gouges go longer between sharpenings. Plus, "I really like the way they make long, stringy curls, not just chips and dust," Brian says. For difficult-grained blanks, such as this walnut crotch, extra moisture also seems to help support the wood fibers, which limits tear-out.

Despite these benefits, Brian points out that it's possible to have too much of a good thing. "By weight, some fresh-from-the-tree blanks contain more water than wood. This can make turning green a very wet event," he says. To minimize potential spray-back, Brian prefers cutting the blanks, and then waiting until they air-dry down to about 20 percent MC. Although still too wet for other types of woodworking, the thick boards and blanks are terrific turning stock.

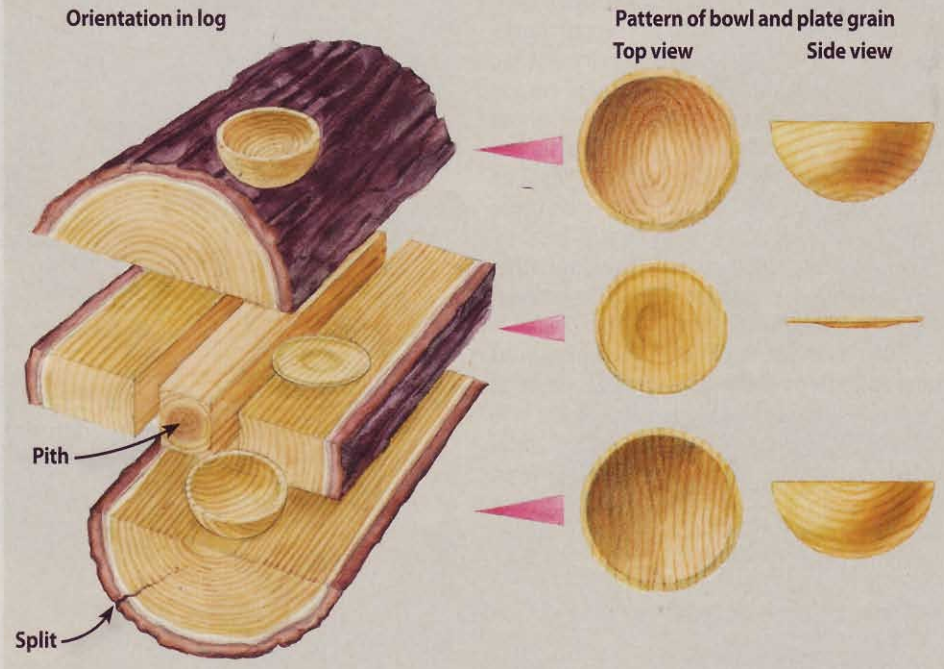
SEE-THROUGH CIRCLE GUIDE

Etched with ½"-inch increment circles, Brian's acrylic layout jig lets him "see" the bowl and set his compass to mark the bowl on the blank.

BIG BLADE, SMALL BITES

To keep your saw set up for resawing, cut out small circles with a series of straight cuts. Knock off the corners to sneak up to your line.

Go with the Grain



When it comes to looks, how you cut the blank log is as important as how you turn it at the lathe. Changing the orientation of a bowl blank within a log will give you very different grain patterns.

Although some turners have found ways of using the pith in their design, removing that 1" square from the center of the log not only will save stock but also make things safer. Big cracks are easy to see, but smaller splits, such as the one shown in the lower log section, can open up and cause a blank to fly apart when you flick the switch. For that reason, inspect your stock before turning.

TURNING IS BEST WITH GREEN WOOD

Turning feels more like peeling while the wood's still wet. You'll get nice, long shavings, even when working wildly figured stock.

Since this sample (photo *above*) was still very wet, Brian rough-turned it to about an inch thick, or half of its finished thickness. Once turned, it's important to prepare rough-turned blanks so that they don't dry out too quickly. Some turners bag rough-turned bowls in brown paper along with a pile of wet shavings to slow down the drying rate, but Brian prefers bagging just the bowl. "As long as the bags are kept out of direct sun, the paper seems to work well by itself," he says. When in doubt, he coats end grain and other wildly figured patches with Anchorseal or shellac to slow down the drying process.

A final word: before you start sawing—your biggest problem may be knowing when to stop. "Sawing into logs is addictive," says Brian. He points to his barn-size collection of dried and drying stock (photo *above right*). "Whether it's boards or turning blanks, once you cut into your first log, you're always thinking about the next."

Written by **Joe Hurst-Wajszczuk**
with **Jim Harrold**
Illustrations: **Tom Rossborough**
Special thanks to **Bud Loeffelholz**

Sources

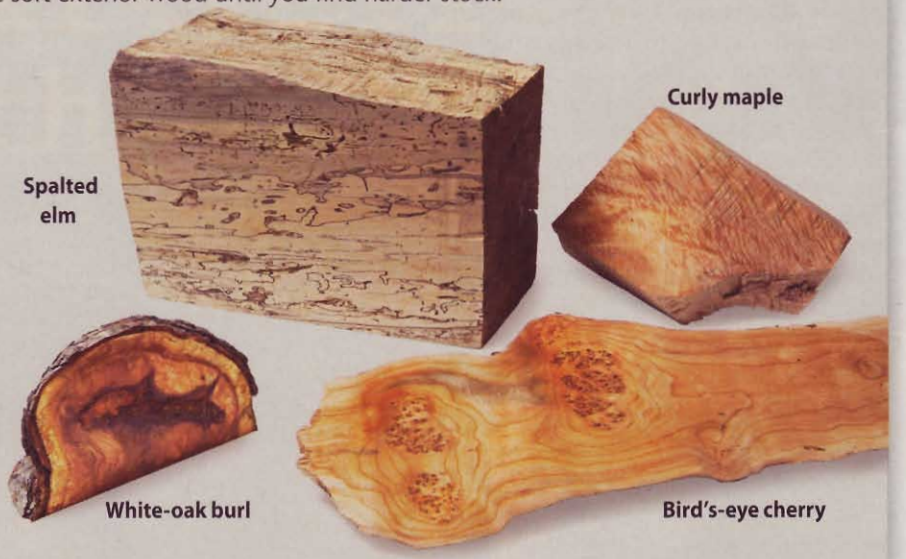
Moisture meter: #mmeter, $39.95, **Metal/Voltage/Stud Sensor** #JDT-03, $12.50, Penn State Industries, 800-377-7297; pennstateind.com
Low-tension bandsaw blade: #SKU715, ¾" x 105", 2/3-tpi, $26.05; other lengths available; PS Wood Machines, 800-939-4414; pswood.com
Anchorseal: $28/gallon U.C. Coatings, 888-363-2628; uccoatings.com

WITH THE MONEY HE SAVED, HE BOUGHT THE BARN

Organized not only by species, but also by when the wood was cut, Brian keeps a few seasons' worth of boards and blanks neatly stacked in his shed.

Diamonds Inside the Rough

These samples prove that real beauty is more than skin-deep. Look for small branches, ripples, or bulges that offer clues of the interesting figure that may hide within. Generally, rot is generally bad, but a little can produce spalting. Cut back the soft exterior wood until you find harder stock.



Brian's Found-Wood Creations

Here are just a few of the items Brian has made from backyard logs and scrap materials he has come across locally.

Better Homes and Gardens®

WOOD® PATTERNS

May 2007 *Issue 176*

Dear Reader: As a service to you, we've included full-size patterns on this insert for irregular shaped and intricate project parts. You can machine all other project parts using the Materials List and the drawings accompanying the project you're building.

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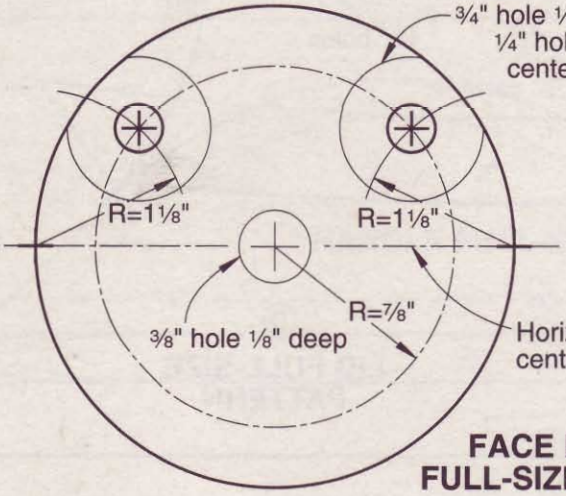
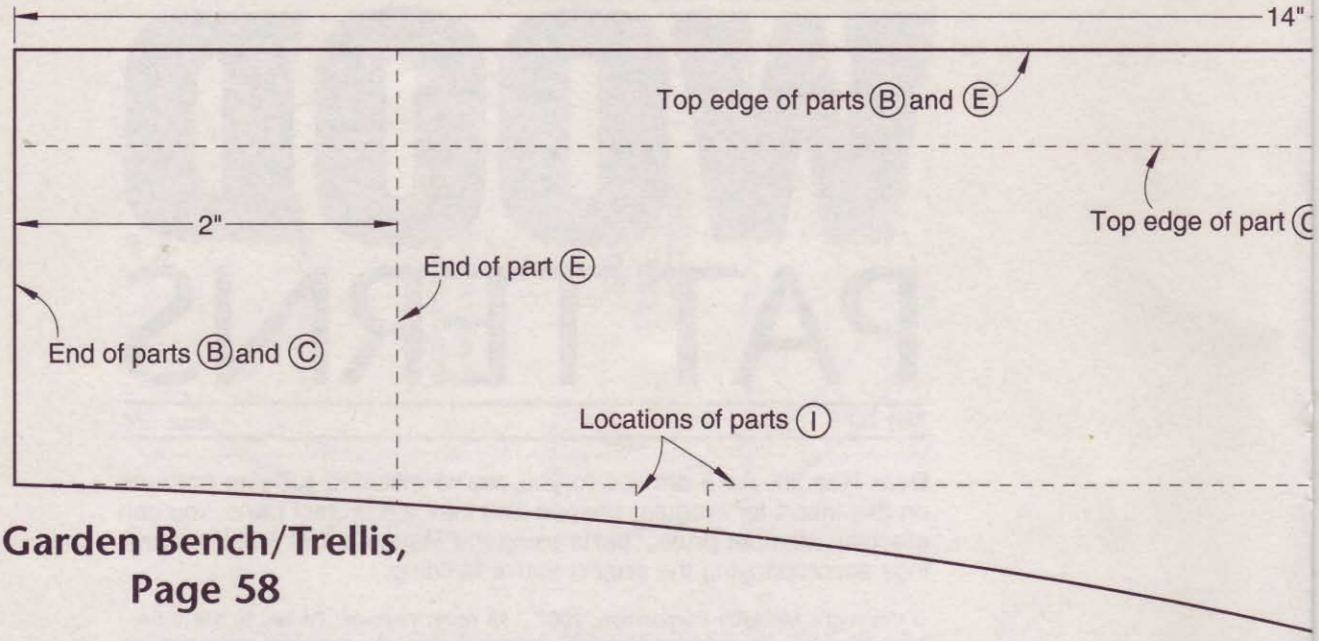
Picture Frames, Page 72

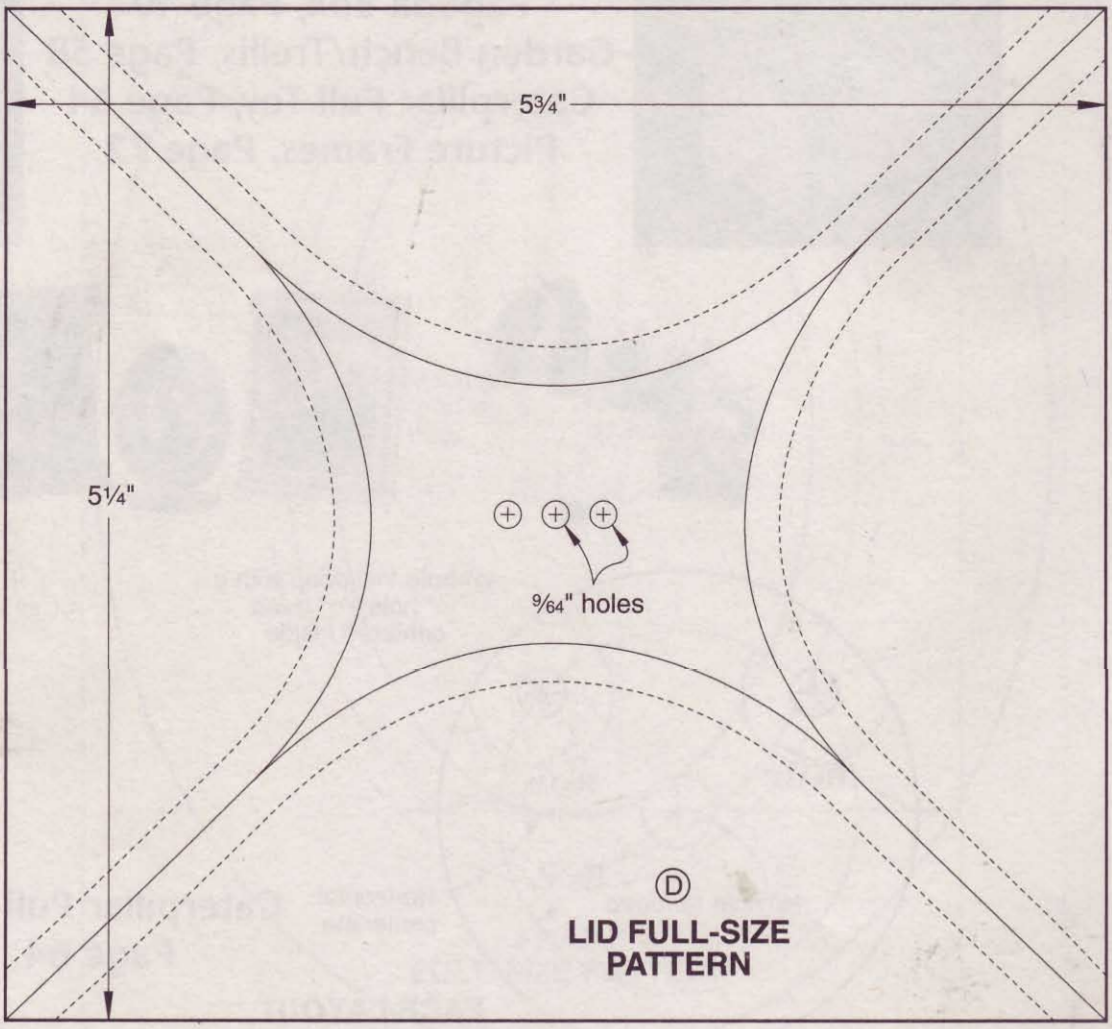


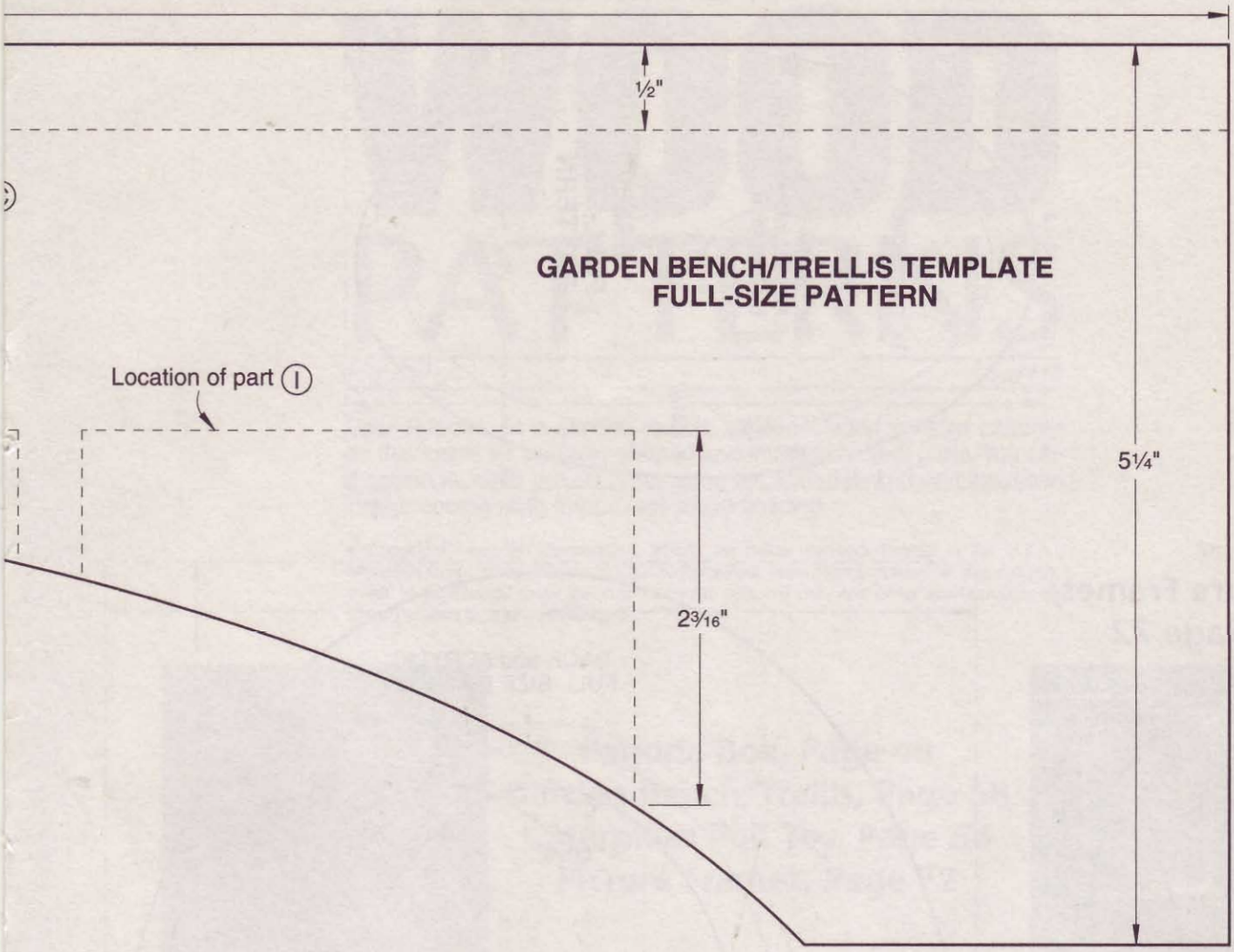
FACE LAYOUT
FULL-SIZE PATTERN

Caterpillar Pull Toy, Page 64



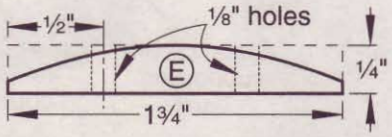
Garden Bench/Trellis, Page 58



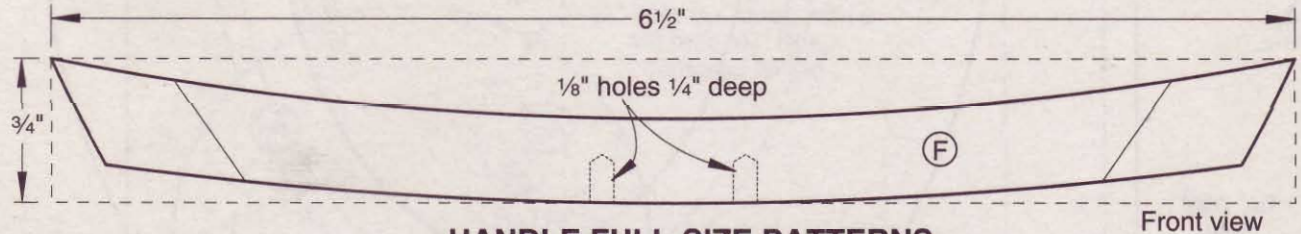


GARDEN BENCH/TRELLIS TEMPLATE
FULL-SIZE PATTERN

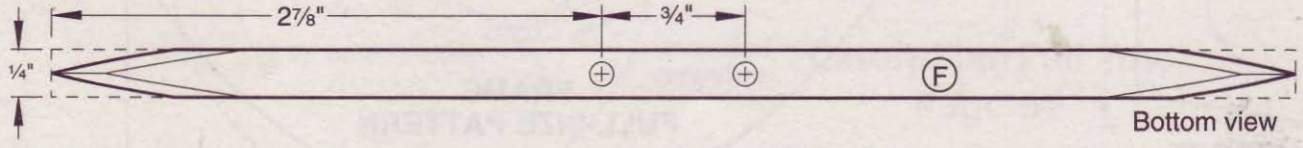
Pagoda Box,
Page 40

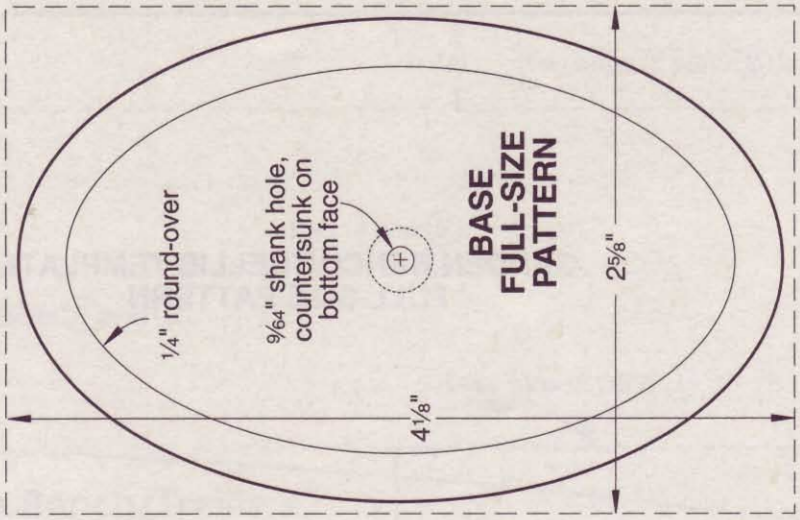


HANDLE BASE FULL-SIZE PATTERN



HANDLE FULL-SIZE PATTERNS





Picture Frames,
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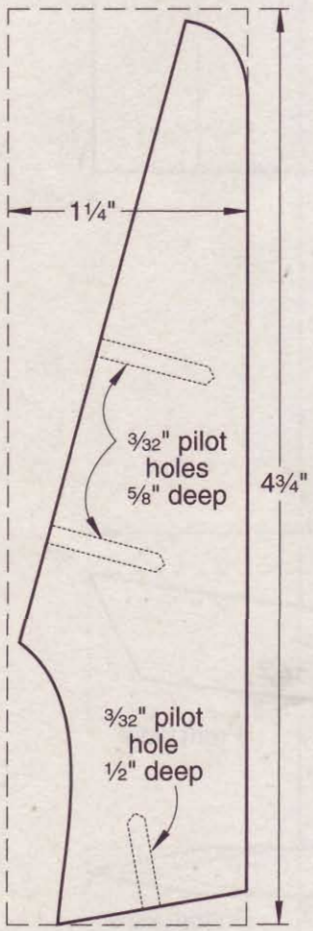
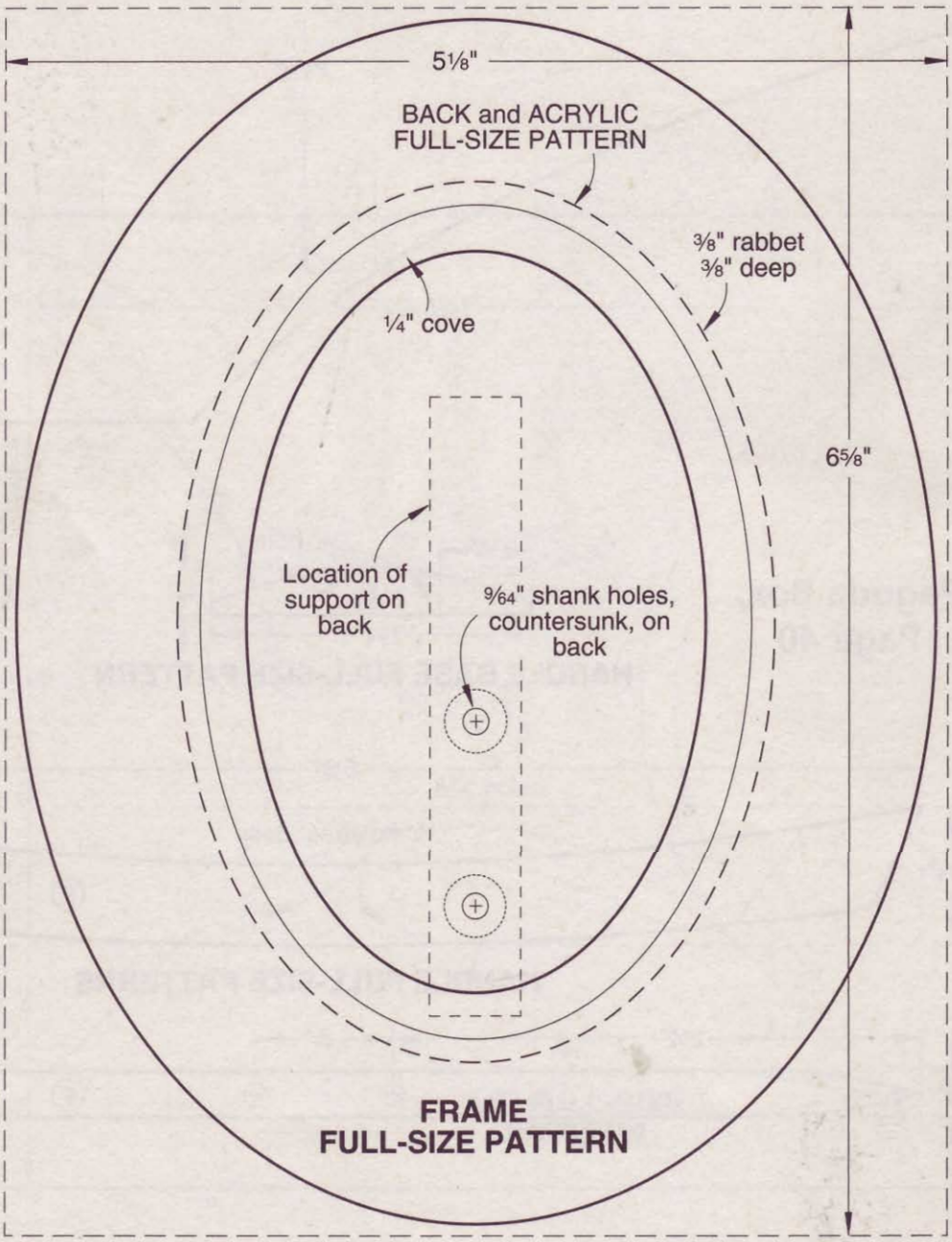


SUPPORT
FULL-SIZE PATTERN



FRAME
FULL-SIZE PATTERN

Simple-to-Make Garden Bench/Trellis

Using just a portable circular saw, jigsaw, and drill, you can build and "plant" this eye-catching masterpiece in a weekend.

Start with the structure

1 From the straightest pressure-treated 4x4s (3½x3½" actual) you can find, crosscut the posts (A) to the needed length to reach the frost line for your area. (Check with your local building department for the frost-line depth.) The minimum length is 111", which consists of 87" above grade and 24" below grade for safe support of the structure [**Drawing 1**].

2 At the crosscut end of each post (A), lay out opposing 5¼" rabbets ¾" deep to receive the crossarms (B). Using your portable circular saw, form the rabbets, as explained in the **Shop Tip**, *next page*. If you plan to build the structure with the seat (not the optional lattice), lay out and form a 5¼" dado ¾" deep in the *inside* face of each post, where dimensioned.

3 For the best appearance, rout a ⅜" round-over along the edges of the posts (A) to remove any unevenness. Then sand the posts to 120 grit.

4 From 2x6 (1½x5½" actual) cedar, rip and crosscut the crossarms (B) to size. Then, from 5/4x6 cedar deck boards, rip and crosscut the joists (C) to size.

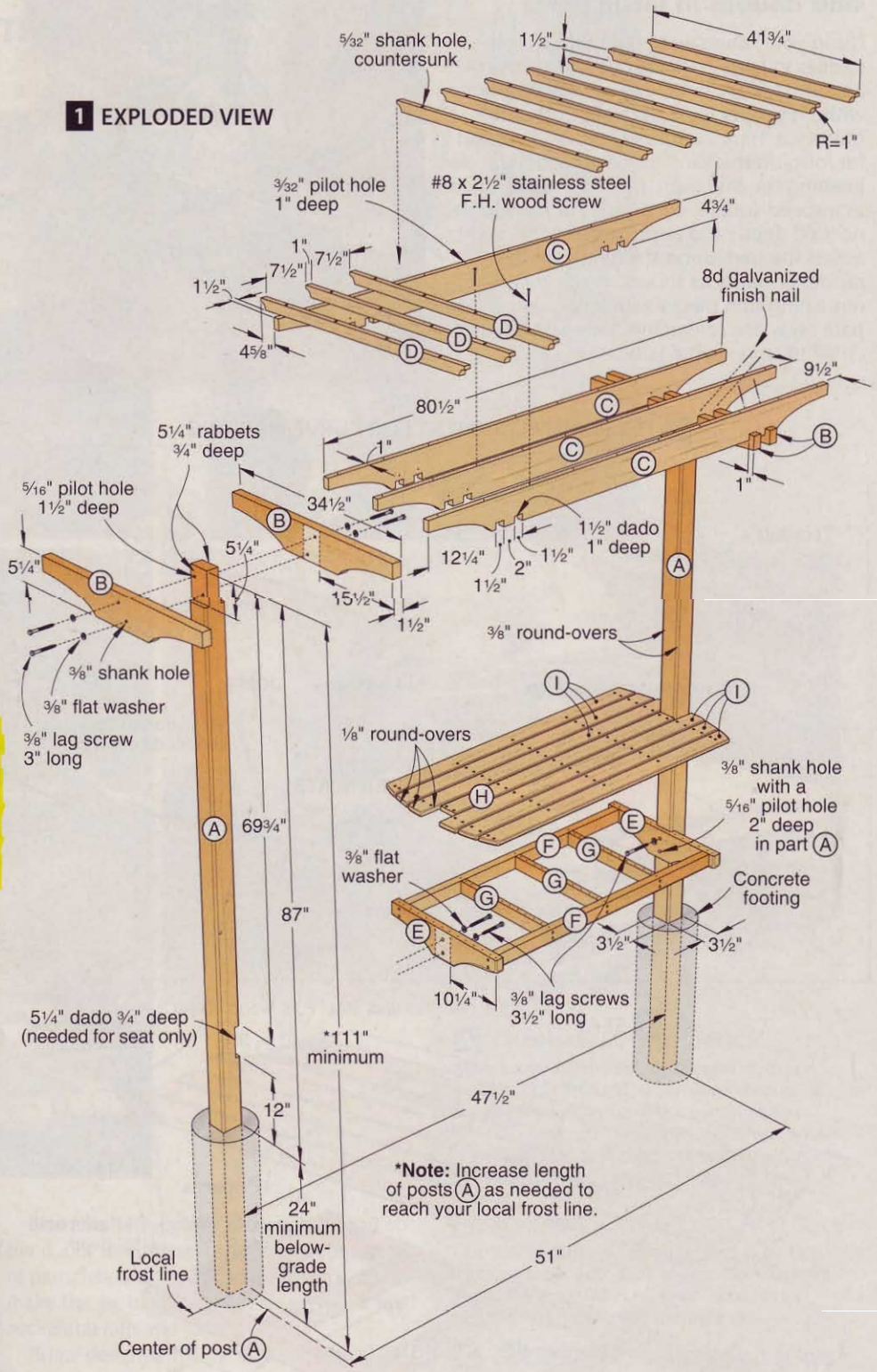
Note: *We based the spacing of the structure joists (C), battens (D), and seat center rails (G) on 5/4 cedar deck boards that measure 1" thick. If your boards do not measure the same thickness, you'll need to adjust the spacing of these parts as needed during assembly.*

5 Lay out a pair of 1½" dadoes 1" deep at each end of a joist (C), where dimensioned [**Drawing 1**], to fit the crossarms (B). Clamp the four joists together on edge with the marked joist outside. Now kerf and clean out the dadoes, using a speed square to guide your saw across the parts.

6 To make a template for drawing the curves on the crossarms (B), joists (C),

As an option, install lattice instead of the seat for a privacy screen plant trellis.

1 EXPLODED VIEW



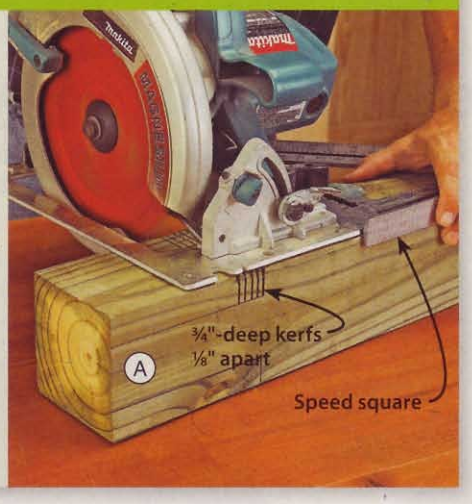
PROJECT HIGHLIGHTS

- Overall dimensions are 80½" wide x 41¾" deep x 92¼" high (in ground).
- Materials needed: Pressure-treated 4x4 posts, dimensional cedar lumber and decking, and ¼" PVC lattice (optional), all found at your local home center.
- A full-size pattern for creating a hardboard template makes laying out the curved parts a snap.
- The structure assembles easily using wood screws, lag screws, and nails.

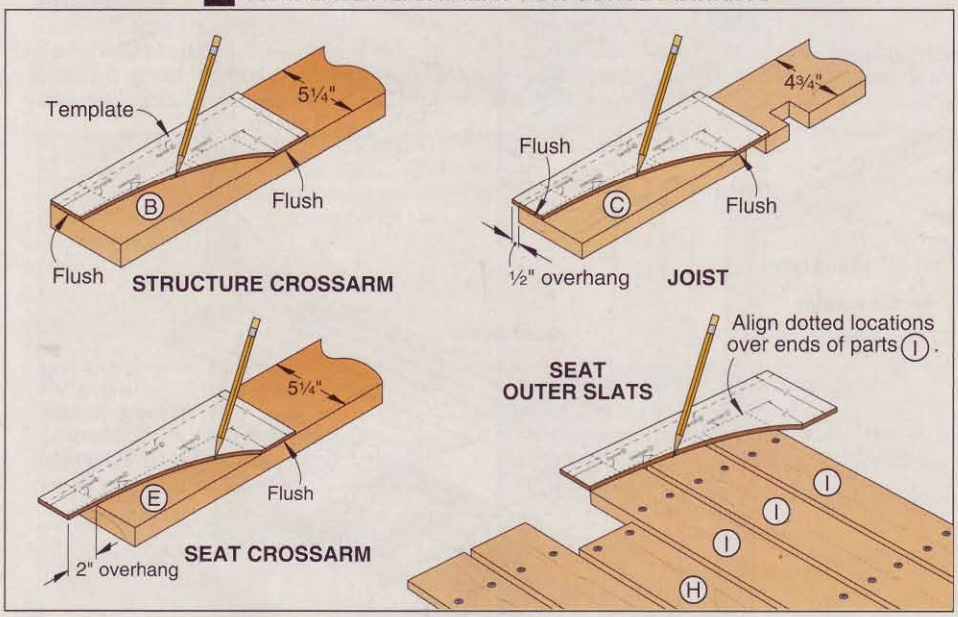
SHOP TIP

A safe way to form rabbets and dadoes in large parts

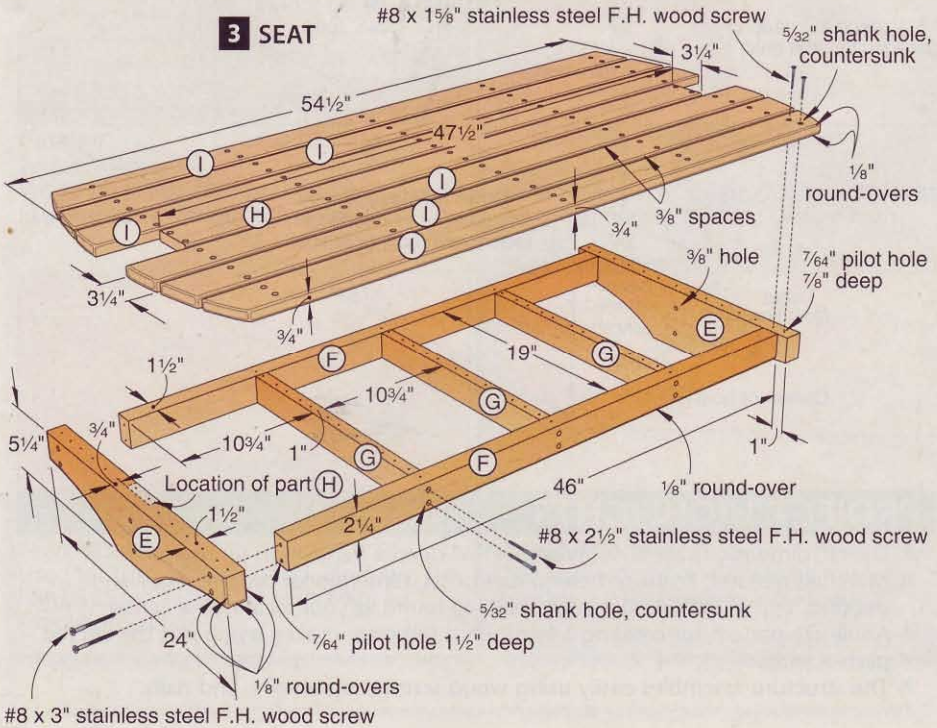
Using your tablesaw to cut rabbets and dadoes in large parts, such as the posts (A) and joists (C), can be awkward and unsafe without proper workpiece support and guidance. Here's a simple and safe method for forming the joints using your circular saw. Keeping the saw tight against a guide, such as a speed square, cut a series of kerfs to the needed depth and approximately ⅛" apart across the part along the length of the rabbet or dado, as shown. Break away the remaining thin pieces with a hammer. Then pare away the remaining material with a chisel to smooth the joint.



2 TEMPLATE ALIGNMENT FOR CURVE MARKING



3 SEAT



and seat parts later, photocopy the garden bench/trellis template full-size pattern from the *WOOD Patterns*® insert. Spray-adhere the pattern to a piece of ¼" hardboard. Jigsaw or scrollsaw the hardboard to shape, and sand the edges smooth.

7 Align the template at each end of the crossarms (B) and joists (C), where shown [**Drawing 2**], and draw the curve [**Drawing 1**]. (After marking one end of each part, flip the part over to mark the other end.) Then jigsaw and sand the parts to the marked lines.

8 From 5/4×6 cedar deck boards, cut the battens (D) to size. Mark a 1" radius at each end of a batten [**Drawing 1**]. Jigsaw and sand to shape. Using this part as a template, mark the remaining battens. Now jigsaw and sand them.

Make the seat

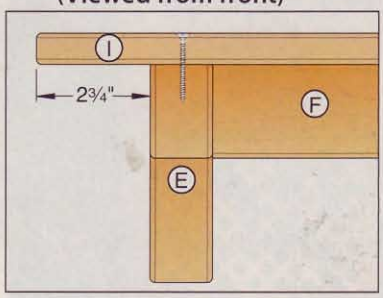
1 Cut the crossarms (E), front/back rails (F), and center rails (G) to the sizes listed. Align the template at each end of the crossarms (E) [**Drawing 2**] and draw the curve. Jigsaw and sand the curves to the lines. Then rout ⅛" round-overs on the crossarms and front/back rails, where shown [**Drawing 3**].

2 Assemble and clamp together the crossarms (E), front/back rails (F), and center rails (G), positioning the front/back and center rails where dimensioned [**Drawing 3**]. Drill the mounting holes, and drive the screws.

3 Cut the center and outer slats (H, I) to the sizes listed. Rout a ⅛" round-over along the *edges* of the slats, where shown. (You'll hand-sand round-overs on the *ends* after shaping the slats.)

4 To mount the center slat (H) to the seat frame, mark centerlines on the top edges of the crossarms (E) and ends of the slat. Position the slat on the frame, centered end to end with the centerlines aligned. Drill the 10 mounting holes, where shown, but drive only five screws along the length to temporarily secure the slat. Now position

3a OUTER SLAT
(Viewed from front)



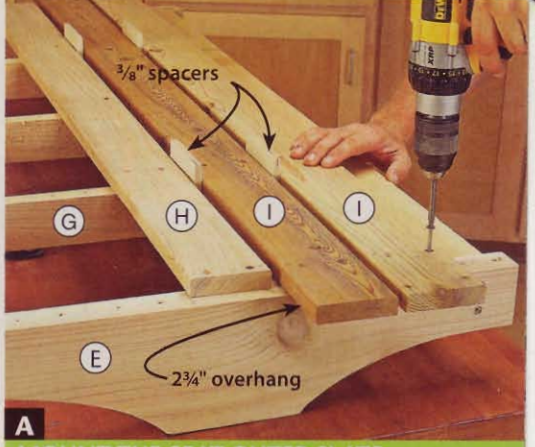
and mount the outer slats (I) to the frame, overhanging the crossarms 2¾" at each end [**Drawing 3a**] and spaced ⅜" apart [**Drawing 3, Photo A**]. Again, secure each slat with only five screws.

5 To round the ends of the outer slats (I) [**Drawing 3**], align the template where shown [**Drawing 2**] and draw the curves. Remove the outer slats and center slat (H). Jigsaw and sand the outer slats to the marked lines. Then, using a 150-grit sanding block, round over the ends and corners to blend with the ⅛" round-overs along the edges. Set the seat frame and slats aside.

Build the lattice frame

1 If you prefer a lattice screen instead of a seat, cut the stiles (J), top rails (K), bottom rails (L), and bottom cap (M) to the sizes listed. Mark the center and ends of the arch on a top rail (K) [**Drawing 4**]. Draw the shape using a fairing stick. (For a free fairing stick plan, go to woodmagazine.com/fairing.) Bandsaw and sand the arch to shape. Using this rail as a template, mark the arch on the remaining rail, and bandsaw and sand it. Sand all of the parts smooth.

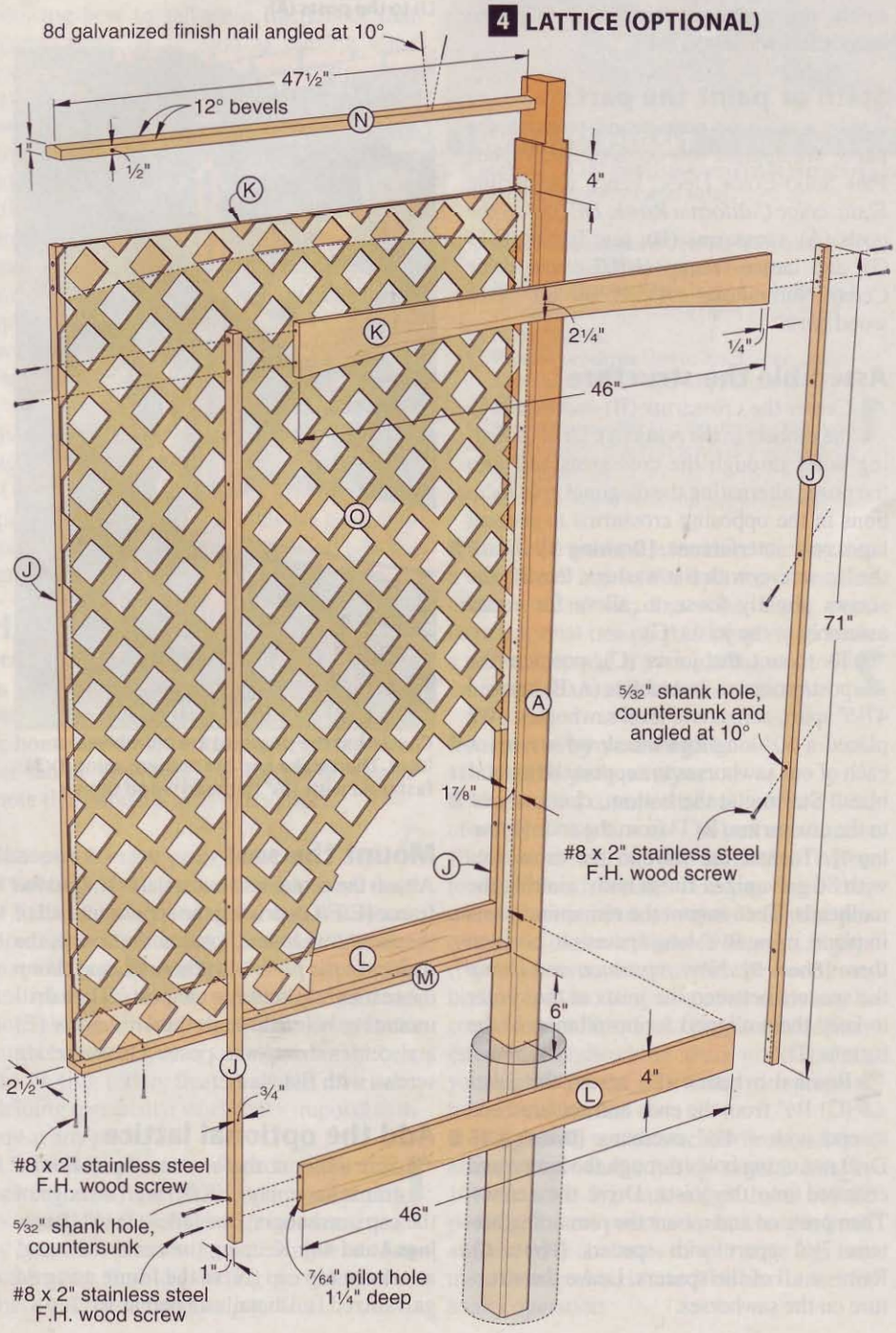
2 To form the frames that sandwich the lattice (O) in place, lay out two stiles (J),



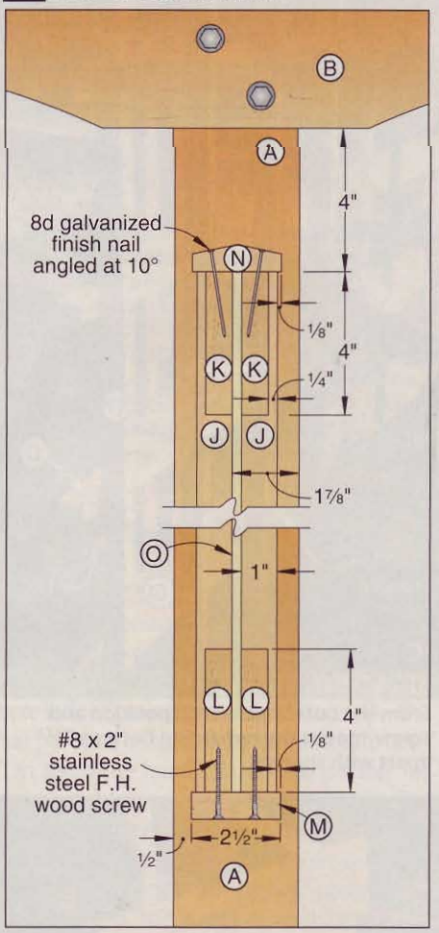
A MOUNT THE SEAT OUTER SLATS

From the center slat (H), mount the outer slats (I) to the seat frame using ⅜"-thick spacers to position them.

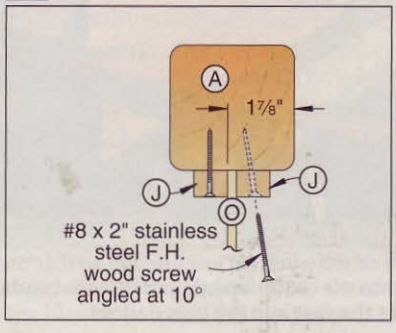
4 LATTICE (OPTIONAL)



4a END SECTION VIEW



4b TOP SECTION VIEW



TOENAIL THE JOISTS IN PLACE

With an outer joist (C) in place, use 9½"-long spacers to position the remaining joists for toenailing.

ATTACH THE BATTENS

From the outer batten (D), position and screw-mount the remaining battens 7½" apart with spacers.

SLIDE THE SEAT INTO POSITION

Spread the posts (A) just enough so that they fit into the center openings in the seat ends. Slide the seat into the post dadoes.

a top rail (K), and a bottom rail (L) on a flat surface in the orientation shown [**Drawing 4**]. Note that the stiles are ¼" proud of the rails [**Drawing 4a**]. Drill the mounting holes, and drive the screws. Repeat to assemble the other frame.

3 Cut the top cap (N) to size. Using your tablesaw and a pushstick for safety, bevel-rip opposing 12° bevels on one face [**Drawing 4**]. Sand the cap smooth.

4 Using your tablesaw or jigsaw, cut the ¼"-thick PVC lattice (O) to size. (We used cedar-color lattice to go with our selected stain.) Because the lattice flexes easily, use a support stand or a helper to keep it flat while you cut it.

Stain or paint the parts

Apply a stain or primer and paint to the parts. We applied two coats of Behr Deck Plus Solid-Color Deck, Fence and Siding Stain, color California Rustic DP-351 on the posts (A), crossarms (B), seat frame (E/F/G), and lattice frames (J/K/L), and color Cedar Naturaltone DP-533 on all other wood parts.

Assemble the structure

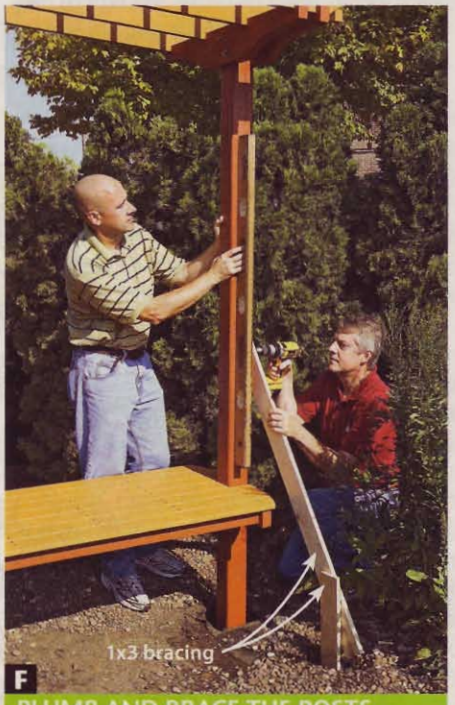
1 Center the crossarms (B) end to end in the rabbets in the posts (A). Drill mounting holes through the crossarms and into the posts, alternating the diagonal hole locations in the opposing crossarms to prevent lag-screw interference [**Drawing 1**]. Drive the lag screws with flat washers, leaving the screws slightly loose to allow for easier assembly of the joists (C).

2 To mount the joists (C), position the post/crossarm assemblies (A/B), spaced 47½" apart, across two level sawhorses. (We placed a 60"-long 2×4 facedown on top of each of our sawhorses to support the assemblies.) Starting at the bottom, clamp a joist to the crossarms (B) 1" from the ends [**Drawing 1**]. Toenail the joist to the crossarms with 8d galvanized finish nails, sinking the nailheads. Then mount the remaining joists in place, using 9½"-long spacers to position them [**Photo B**]. Now reposition and clamp the spacers between the joists at the center to keep them aligned for installation of the battens (D).

3 Position a batten (D) across the joists (C) 1½" from the ends and centered end to end with a 4⅝" overhang [**Drawing 1**]. Drill mounting holes through the batten and centered into the joists. Drive the screws. Then position and mount the remaining battens 7½" apart with spacers [**Photo C**]. Remove all of the spacers. Leave the structure on the sawhorses.

INSTALL A LATTICE FRAME

With the frame assembly (J/K/L/M/N) clamped in position, screw-mount the stiles (J) to the posts (A).



PLUMB AND BRACE THE POSTS

Check that the posts (A) are plumb with a level. Then stake and brace them using 1×3s fastened with 1¼" flathead wood screws.

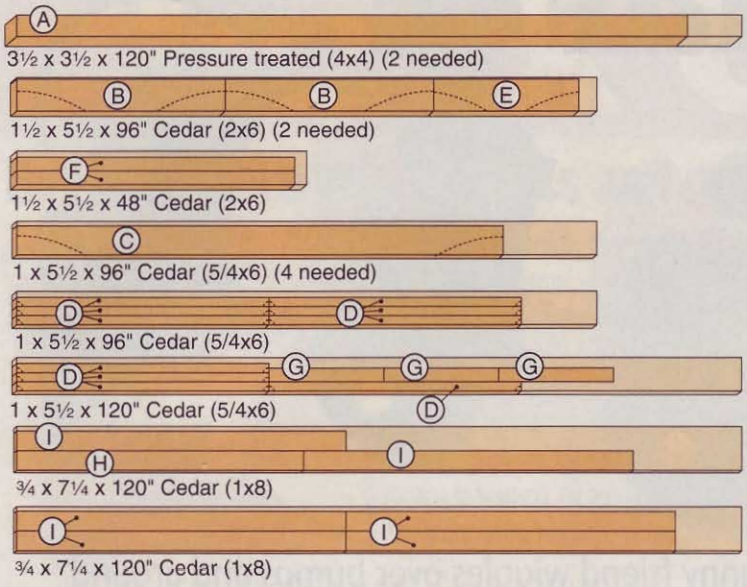
Mount the seat

Attach the center and outer slats (H, I) to the frame (E/F/G), driving the screws into all of the mounting holes. Position the seat in the dadoes in the posts (A) [**Photo D**], and clamp the seat tightly between the posts. Then drill mounting holes through the crossarms (E) and centered into the posts. Drive the lag screws with flat washers.

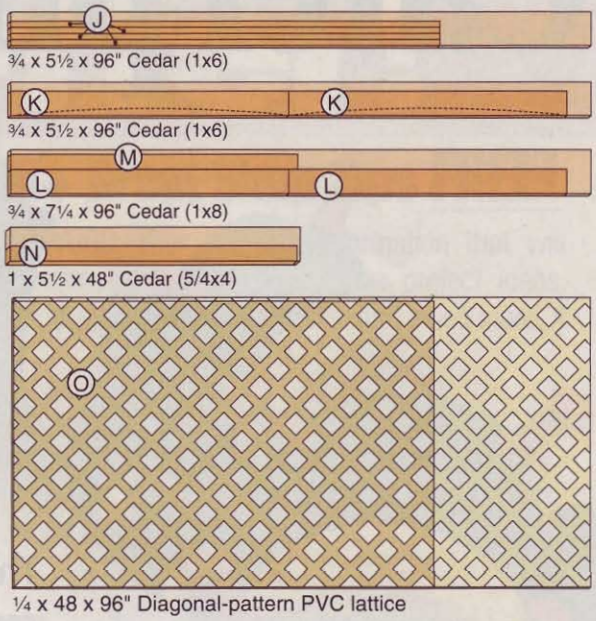
Add the optional lattice

1 Screw-mount the bottom cap (M) to a frame assembly (J/K/L) with an edge of the cap overhanging the stiles (J) ⅛" [**Drawings 4** and **4a**]. Keeping the same overhang, attach the top cap (N) to the frame using 8d galvanized finish nails angled at 10°.

Cutting Diagram
Structure with seat



Cutting Diagram
Optional Lattice



2 Clamp the frame assembly (J/K/L/M/N) between the posts (A), positioning the stiles (J) 1⅞" from the face of the posts and the bottom face of the top cap (N) 4" from the bottom of the crossarms (B) [**Drawings 4** and **4a**, **Photo E**]. Drill the mounting holes through the stiles and into the posts, and drive the screws.

3 Place the lattice (O) on the frame. Then position the remaining frame assembly (J/K/L) on the lattice. As before, screw the bottom cap (M) and nail the top cap (N) to the frame, and screw the stiles (J) to the posts (A), angling the mounting holes at 10° [**Drawings 4** and **4b**]. Now tighten the lag screws in the crossarms (B) to secure them to the posts (A).

Install the structure

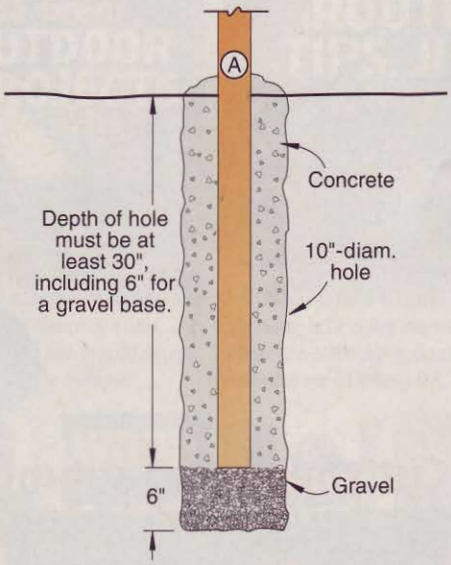
Caution: *Before you dig the postholes, dial the "One Call" phone number for your state or province, and ask to have the buried pipes and wires on your property located and marked. If you can't find the number, call the North American One Call Referral System at 888/258-0808.*

1 On flat ground, mark the centers for two holes for the posts (A) spaced 51" apart [**Drawing 1**].

2 Using a posthole digger or an auger, dig/drill 10"-diameter holes, centered on the marked locations, to the needed depth to reach your frost line plus another 6" for a gravel base [**Drawing 5**]. Pour 6" of gravel into each hole.

3 With a helper, set the structure in place. Plumb the posts (A) and level the unit, adding or removing gravel as needed. Then brace the posts [**Photo F**]. Now fill the holes with concrete.

5 POSTHOLE SECTION VIEW



4 After the concrete cures, remove the 1x3 bracing. Fill the screw and nail holes with acrylic caulk, and touch up with stain or paint. Now put in some plants and flowers, step back, and admire your amazing handiwork.

Written by **Owen Duvall** with **Dave Grieve**
Project design: **Jeff Mertz**
Illustrations: **Roxanne LeMoine; Lorna Johnson**

Materials List

Structure		FINISHED SIZE T	W	L	Matl.	Qty.
A	posts	3½"	3½"	†	PT	2
B	crossarms	1½"	5¼"	34½"	C	4
C	joists	1"	4¾"	80½"	C	4
D	battens	1"	1½"	41¾"	C	10
Seat						
E	crossarms	1½"	5¼"	24"	C	2
F	front/back rails	1½"	2¼"	46"	C	2
G	center rails	1"	2¼"	19"	C	3
H	center slat	¾"	3¼"	47½"	C	1
I	outer slats	¾"	3¼"	54½"	C	6
Lattice (optional)						
J	stiles	¾"	1"	71"	C	4
K	top rails	¾"	4"	46"	C	2
L	bottom rails	¾"	4"	46"	C	2
M	bottom cap	¾"	2½"	47½"	C	1
N	top cap	1"	2½"	47½"	C	1
O	lattice	¼"	47¼"	70¾"	L	1

†The minimum length is 111" for posts (A). This includes a below-grade minimum length of 24" for safe support of the structure. Increase the length of the posts as needed to reach your local frost-line depth.

Materials key: PT–pressure-treated, C–cedar, L–diagonal-pattern PVC lattice.
Supplies: Spray adhesive; #8×1¼", #8×1⅝", #8×2", #8×2½", and #8×3" stainless steel flathead wood screws; ⅜" lag screws 3" long (8); ⅜" lag screws 3½" long (4); ⅜" flat washers (12); 8d galvanized finish nails; 50-pound bag of gravel; concrete (one 60-pound bag per 12" depth of posthole); acrylic caulk.
Bits: ⅛" and ⅜" round-over router bits.

Tug-along Caterpillar

This funny friend wiggles over bumps and around corners to the delight of children and parents.

PROJECT HIGHLIGHTS

- Overall dimensions: 4 7/16" wide × 3 5/16" high × 27 15/16" long.
- Buying stock wood parts speeds the construction, and makes it easy to build more than one.
- We used poplar for the painted version *above* and Baltic birch plywood for the clear-finished version on *page 66*.
- For the items needed to build this project, see *page 67*.

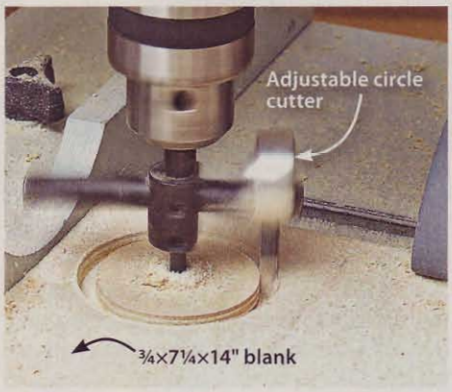
Skill Builder

- Learn simple production methods for making and finishing multiple parts.

SHOP TIP

To eliminate tear-out, cut the circles 5/8" deep from one side, flip the blank, and complete the cuts from the other side.

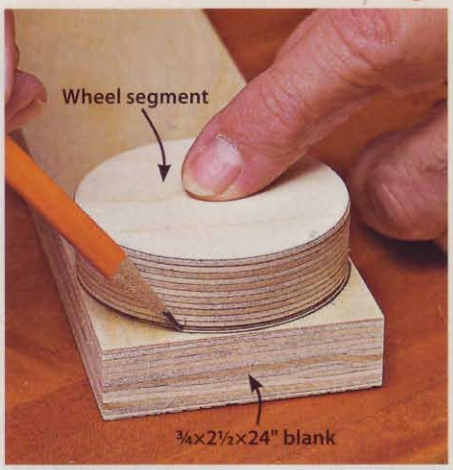
Cut the round segments



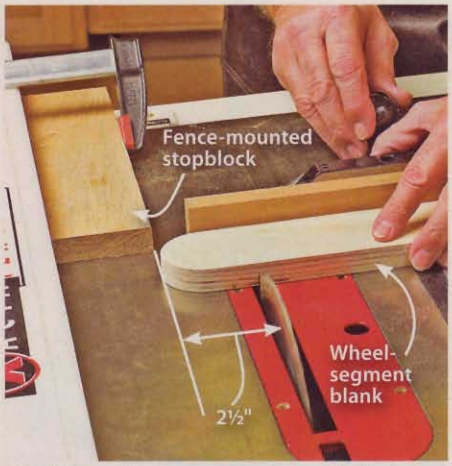
1 With an adjustable circle cutter, cut seven 2½"-diameter round segments from a ¾×7¼×14" blank. See the **Shop Tip** at *left*.

2 To finish-sand the round segment edges, use a ¼-20×2" roundhead bolt and nut as a mandrel, and spin the segments on your drill press.

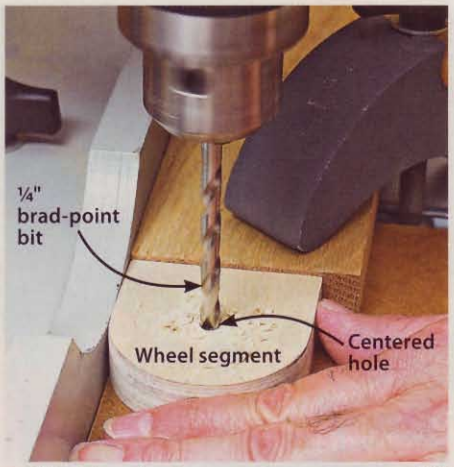
Form the wheel segments



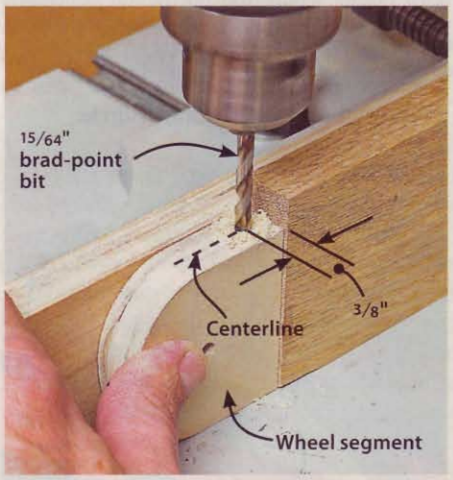
1 For the wheel segments, cut a ¾×2½×24" blank. Using a round segment as a template, trace a radius on each end of the blank. Bandsaw and disc-sand the blank ends.



2 Using a fence-mounted stopblock, crosscut a wheel segment from each end of the blank. Now trace, bandsaw, sand, and crosscut until you have eight segments.



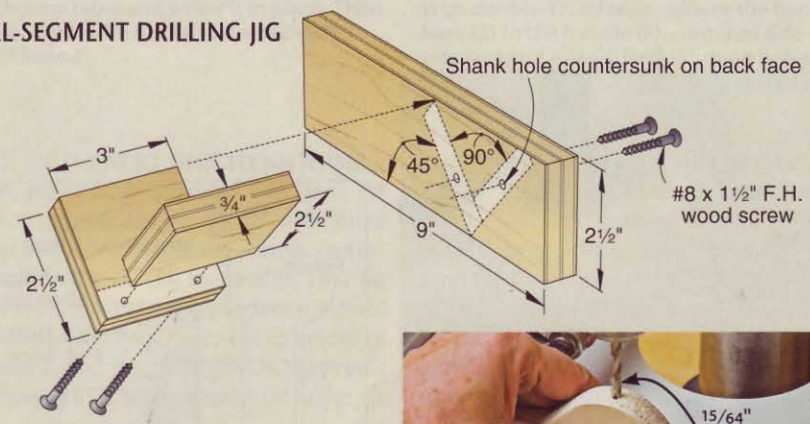
3 Position the fence and stop on your drill press to center a ¼" brad-point bit on a wheel segment. Drill holes in the segments.



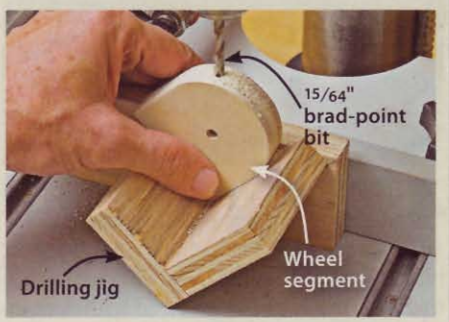
4 Positioning the wheel segments with the drill-press fence and stopblock, drill 9/16"-deep axle-peg holes in both edges.

Note: *The axle pegs and Shaker-peg tenons are* nominally *7/32". Ours fit better in a 15/64" hole. Drill test holes in scrap to determine the appropriate size for your parts.*

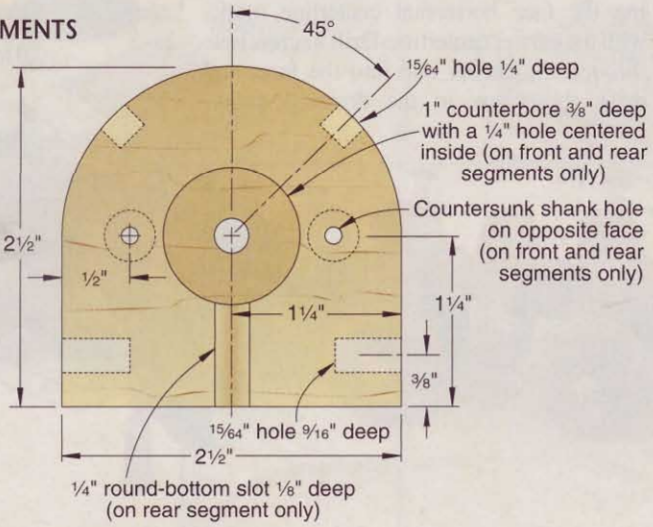
WHEEL-SEGMENT DRILLING JIG



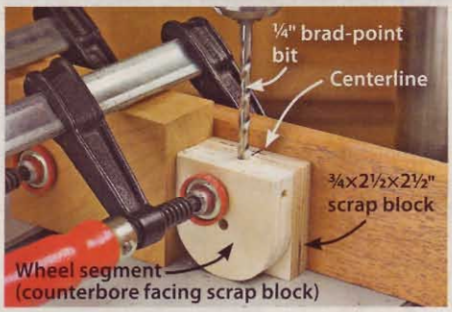
5 To drill the Shaker-peg holes in the wheel segments, build the jig shown *above*. Then clamp the jig to the drill-press fence, with the bit centered over the bottom of the jig "V" and on the thickness of a wheel segment. Now drill a ¼"-deep hole in each wheel segment, flip them, and repeat.



WHEEL SEGMENTS

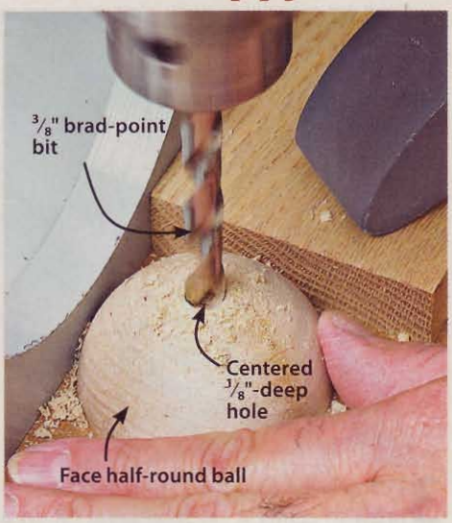

45°
15/64" hole ¼" deep
1" counterbore ⅜" deep with a ¼" hole centered inside (on front and rear segments only)
Countersunk shank hole on opposite face (on front and rear segments only)
2½"
½"
1¼"
1¼"
⅜"
15/64" hole 9/16" deep
2½"
¼" round-bottom slot ⅛" deep (on rear segment only)

6 On the front and rear wheel segments, use a 1" Forstner bit to drill a ⅜"-deep counterbore, centered on the ¼" hole. Then drill the countersunk shank holes as shown in the drawing at *right*.

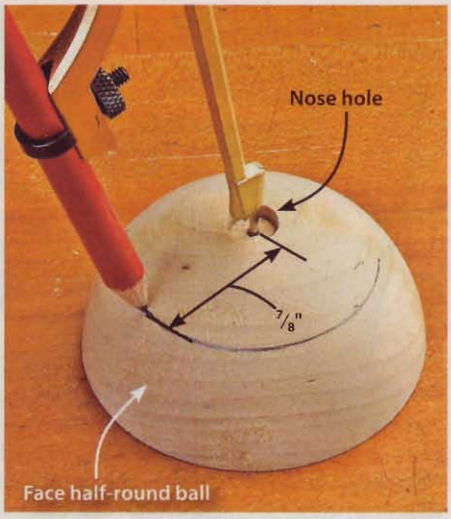


7 To make a cord slot in the rear wheel segment, cut a ¾×2½×2½" scrap block, and mark a centerline on one edge. Then clamp the block and the rear wheel segment to the drill-press fence, aligning the centerline and the joint between the two pieces with the tip of a ¼" brad-point bit. Now drill a hole that intersects the wheel-segment counterbore.

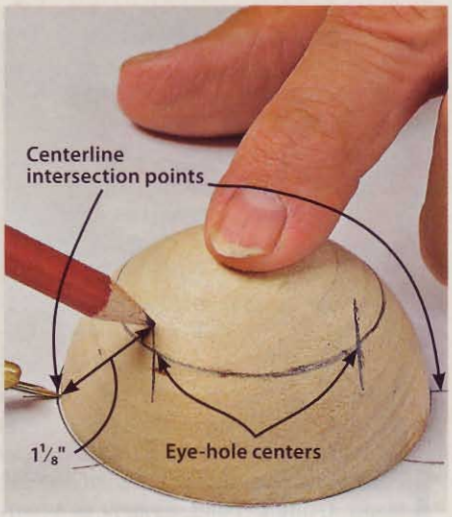
Make a happy face



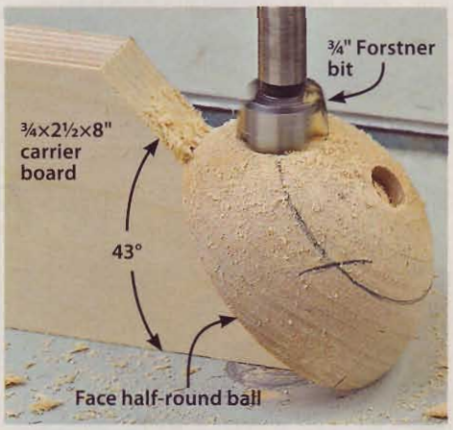
1 Chuck a 3/8" brad-point bit into your drill press, center the face half-round ball on the bit, and drill a 1/8"-deep nose hole.



2 To lay out eye-hole centers on the face, place a compass point in the center of the nose hole, and draw a 7/8"-radius circle.

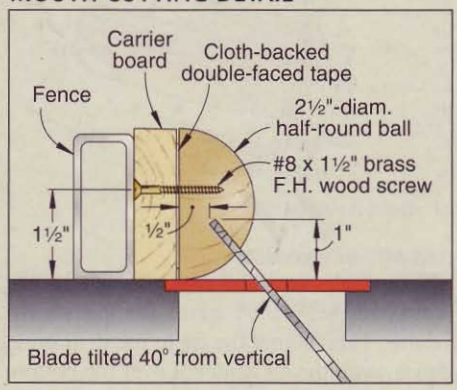


3 Place the face on the **Face Layout** pattern on the *WOOD Patterns®* insert. Transfer two points where the horizontal centerline intersects the circle onto the edge of the face. Then place the compass point at the two intersection points, and draw 1 1/8" arcs to intersect the previously drawn circle.

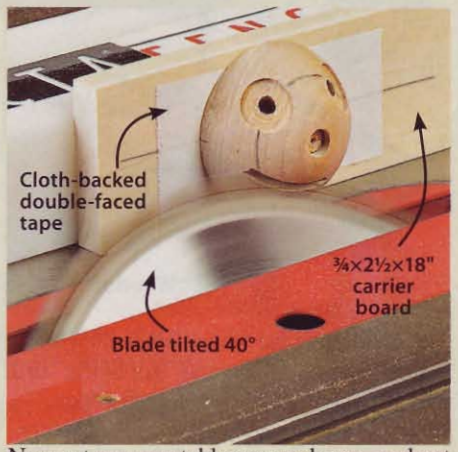


4 To drill the face eye holes, cut a 3/4x2 1/2x8" carrier board, and cut a 43° angle at one end. Then chuck a 3/4" Forstner bit into your drill press. Next adhere the face to the carrier board angled end with double-faced tape, aligning the edge of the face flush with the bottom of the carrier and one eye-hole center with the bit. Clamp the carrier to the drill-press table, and drill a 1/16"-deep counterbore. Now switch to a 1/4" brad-point bit, and drill a 9/16"-deep hole, centered in the counterbore. Reposition the face and drill the other counterbored eye hole.

MOUTH CUTTING DETAIL

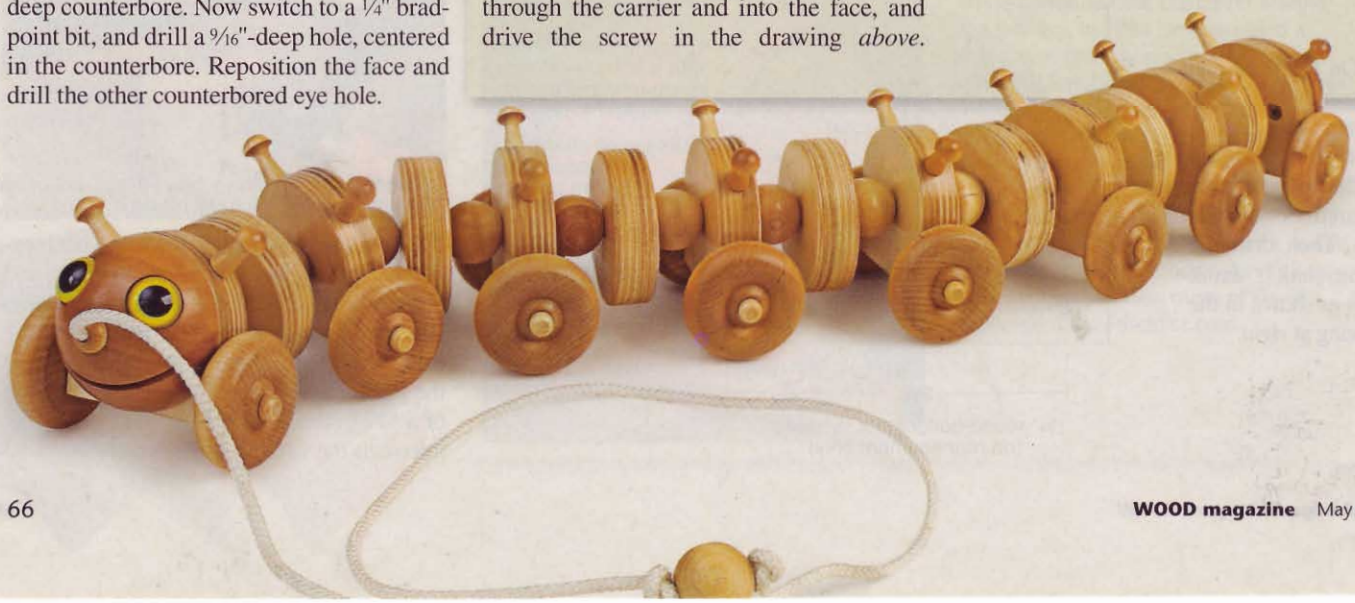


5 To form the mouth, cut a 3/4x2 1/2x18" carrier board, and draw a 6"-long horizontal centerline at one end. Then adhere the face to the carrier with double-faced tape, aligning the face horizontal centerline marks with the carrier centerline. Drill a screw hole through the carrier and into the face, and drive the screw in the drawing *above*.

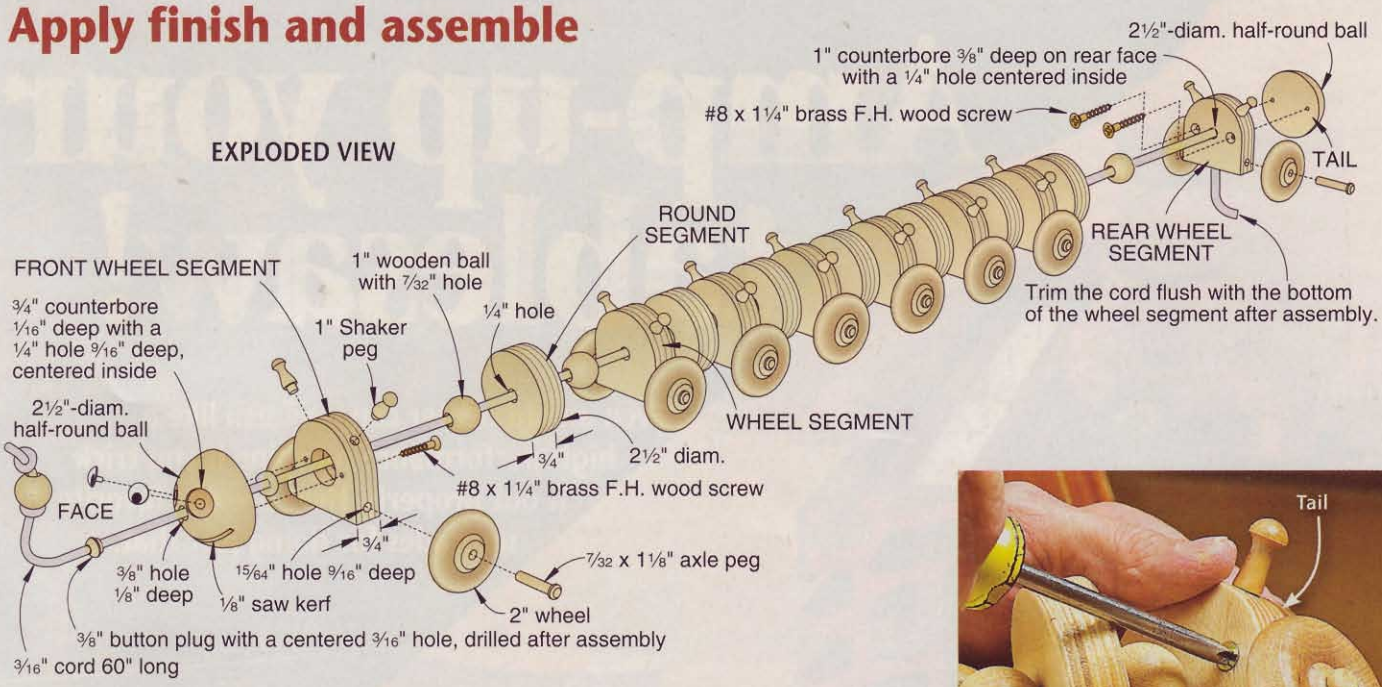


Now set up your tablesaw as shown, and cut the mouth. Remove the face from the carrier.

Note: *Use* **cloth-backed** *double-faced tape to adhere the face to the carrier board, and squeeze the parts firmly together in a vise.*



Apply finish and assemble


EXPLODED VIEW
2½"-diam. half-round ball
1" counterbore ⅜" deep on rear face with a ¼" hole centered inside
#8 x 1¼" brass F.H. wood screw
TAIL
ROUND SEGMENT
REAR WHEEL SEGMENT
Trim the cord flush with the bottom of the wheel segment after assembly.
FRONT WHEEL SEGMENT
¾" counterbore 1/16" deep with a ¼" hole 9/16" deep, centered inside
1" wooden ball with 7/32" hole
1" Shaker peg
¼" hole
2½"-diam. half-round ball
WHEEL SEGMENT
¾"
2½" diam.
#8 x 1¼" brass F.H. wood screw
FACE
¾"
⅜" hole ⅛" deep
15/64" hole 9/16" deep
⅛" saw kerf
7/32 x 1⅛" axle peg
2" wheel
⅜" button plug with a centered 3/16" hole, drilled after assembly
3/16" cord 60" long

1 Finish-sand the parts. Then clear-finish or paint the parts as desired. (We sprayed an aerosol satin polyurethane on the clear-finished caterpillar, and used Rust-Oleum Painter's Touch spray paint in the following colors for the painted version: no. 1934 Meadow Green for the wheel segments, face, and tail; no. 1945 Sun Yellow for the round segments and axle pegs; no. 1966 Apple Red for the Shaker pegs and button plug nose; and no. 1979 Gloss Black for the wheels and balls.) To hold the parts for finishing, see the sidebar *below*.

2 With the paint dry, epoxy the Shaker pegs into the wheel-segment upper holes in the drawing *above*. Then slip wheels onto axle pegs, and epoxy the pegs into the wheel-segment lower holes. Make sure the wheels turn freely.

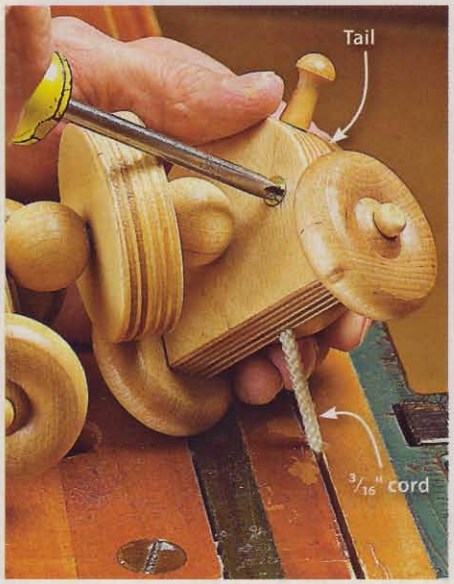
3 Epoxy the button plug nose into the face center hole. Then drill a centered 3/16" hole for the cord through the nose and face. Now epoxy the eyes in place.

4 Adhere the face and tail to the front and rear wheel segments with double-faced tape. Using the segment shank holes as guides, drill pilot holes into the face and tail. Separate the parts and remove the tape.

5 Tie a knot at one end of the cord, slip on a ball, and tie a second knot as close to the ball as possible. Then thread the cord through the face, and tie a third knot 24" from the second one. Screw the face to the front wheel segment, capturing the knot in the counterbore. Now thread a ball onto the cord, followed by a round segment, and then a wheel segment. Repeat until the last wheel segment is in place.

6 Pull the cord to take the slack out of the caterpillar body. Then lay the cord into the round-bottom slot in the rear wheel segment, and screw the tail in place, loosely pinching the cord between the wheel segment and tail.

7 Clamp the end of the cord in your bench vise, draw the parts snugly together, and



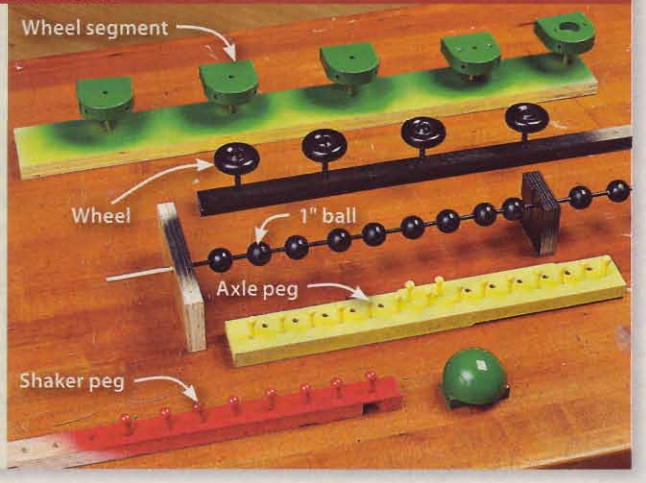
tighten the tail screws, as shown *above*. Take the caterpillar for a test crawl to make sure it is not too stiff or too loose. Make any necessary adjustment to the cord tension, and trim it flush with the bottom of the wheel segment. Now present this cheerful follow-around fellow to your favorite toddler.

Written by **Jan Svec** with **Chuck Hedlund**
Project design: **Jan Svec; Kevin Boyle**
Illustrations: **Roxanne LeMoine; Lorna Johnson**

HOW TO SPRAY SMALL PARTS THE EASY WAY

For this project, you'll spray-finish a total of 81 small parts. Clearly, you'll need a simple way to hold them. The photo at *right* shows how.

For the body segments and wheels, drill ¼" holes in pieces of scrap, insert 2"-long dowels, and place the parts onto the dowels. Slip the balls onto a piece of 3/16" dowel, and slip the dowel into holes drilled in scrap blocks. To hold the axle and Shaker pegs and protect the glue surfaces, drill holes into scrap strips, and insert the pegs.



Supplies: Cloth-backed double-faced tape, #8x1½" brass flathead wood screw, #8x1¼" and #8x1½" flathead wood screws, epoxy, ¼-20x2" roundhead bolt and nut (for the drill-press sanding mandrel).
Bits: Adjustable circle cutter; 15/64", ¼", and ⅜" brad-point bits; ¾" and 1" Forstner bits.

Source

Parts kit. 2" wheels (16), 7/32x1⅛" axle pegs (16), Shaker pegs (16), 1" balls with a 7/32" hole (15), 2½" half-round balls (2), ⅜" button plug (1), plastic eyes (2), 3/16" cord 60" long. Order no. 3026, $19.99 plus shipping and handling. Meisel Hardware Specialties. Call 800/441-9870, or go to meiselwoodhobby.com.

Amp-up your tablesaw!

Even an old beater can perform like a high-performance machine if you trick it out properly. Here are our favorite upgrades for doing just that.

For most woodworkers, the shop revolves around the tablesaw. So it makes sense to pump up that machine to be the best it can be. Sometimes, achieving peak performance with this vital tool requires upgrading factory parts with aftermarket add-ons. But with hundreds—if not thousands—of catalog and Web pages devoted to tablesaw accessories, finding the right ones can be a crapshoot. To help you out, we shop-tested dozens of today's greatest tablesaw add-ons and winnowed the list down to these 19 items most deserving a spot in your shop. (Prices shown do not include shipping, where applicable.)

Keep control of your work

Moving a workpiece smoothly through the blade markedly improves cut quality. Good workpiece control also helps you start and finish your project with all ten fingers. These eight products excel on both counts.

Biesemeyer Home Shop Fence, $335 ▼

Biesemeyer (52" rails, BHS52W)
800/782-1831, biesemeyer.com

In recent years, tablesaw manufacturers have really stepped up their games when it comes to rip fences. Many factory fences now equal or exceed aftermarket models. But we've never found a fence we like better than a Biesemeyer. Simple and solid, with super-flat faces, it doesn't provide fancy microadjusters or T-slots for mounting jigs or feather boards. But it does its job supremely well and never has let us down in many years of use.

Aftermarket miter gauge, $100–$240 ▲

Shown: JessEm MiteRExcel (#7100), $240
866/272-7492, jessem.com

Factory-supplied tablesaw miter gauges have a reputation for being inadequate and inaccurate. That's why replacement miter gauges—some souped-up with length stops, adjustable-width miter bars, and positive stops every degree (or even down to .1°)—are all the rage among woodworkers. We heartily recommend an upgrade here, but we're not going to tell you which one to buy...yet. Why? Because we're testing about a dozen such miter gauges right now, and we'll share our findings in issue 179 (October 2007).

MJ Splitters, $15/pair ▲
Micro Jig, Inc.
407/696-6695, microjig.com

Most serious tablesaw accidents result from kickback (when the rising teeth at the rear of the spinning blade lift and launch the workpiece back at the operator). Splitters prevent kickback, but if you put your factory guard on the shelf, you're robbing yourself of the protection provided by its splitter. MJ Splitters mount on a zero-clearance throat-plate insert you buy or make yourself. (Learn how at woodmagazine.com/zeroclearance.) The slightly off-center mounting pins allowed us to rotate the splitter 180° to actually press the workpiece against the fence. It's like having a tiny feather board for the "keeper" *behind* the cut. Use the green splitters with your full-kerf blades; use yellow splitters with thin-kerf blades.

GRR-Ripper, $70 ▶
Micro Jig, Inc.
407/696-6695, microjig.com

We balked, too, when we saw the price tag. $70...for a *pushblock?* But we had to use the GRR-Ripper system only once to realize its value far exceeds its price tag. The "tunnels" created by the fixed outside legs and repositionable middle leg allow the GRR-Ripper to pass over the blade without damage, while keeping your hand well away. Just as important, those grippy legs provide equal pressure on both pieces as you feed, further reducing the likelihood of kickback. For ripping stock less than 3" wide, we lowered the black outrigger to tabletop level, as shown, and handled narrow workpieces—even as narrow as ¼"—with safety and confidence.

Hold-downs, $20–$40 ▶
Shown: Grip-Tite, Mesa Vista Design
800/475-0293, grip-tite.com

Every tablesaw (and router table, for that matter) needs a good set of hold-downs and hold-ins, such as feather boards, to keep the workpiece flat on the table and tight against the fence. On *page 78*, you'll find our review of four work-holders that would make a good addition to your shop. Check it out before you buy.

◀ Sub-Fence Hole Clamps, $25/pair
Mesa Vista Design
800/475-0293, grip-tite.com

Traditional clamps always seem to get in the way of the workpiece when you use them to temporarily mount an auxiliary fence face. (And we just hate driving screws into a perfectly good fence if we can avoid it.) Sub-Fence Hole Clamps fit into holes you drill into the top edge of your auxiliary fence face. Use just one Hole Clamp to add a stopblock to your rip fence to gauge repeated crosscuts.

Flip-Top Portable Work Support, $30 ▲
Ridgid (available at The Home Depot)
800/474-3443; ridgid.com

If you don't have a cabinet saw, Ridgid's Flip-Top stand makes a great extra hand in the shop. We found that its tilting top gently guides a sagging workpiece up to tablesaw-top level, so we could set it up a few feet behind the saw for outfeed support without fear of knocking it over. We tried. Repeatedly. (The large 21×25" footprint helps, too.) This inexpensive support is stingy on storage space, folding to only 3½" flat.

◀ Outfeed Rollers, $300
HTC (model HOR-1038U)
800/624-2027,
htcproductsinc.com

We've had HTC's 37"-wide Outfeed Rollers on the cabinet saw in our shop forever. They provide at least 48" of stone-solid workpiece support behind the blade, making it safer and easier to rip long and wide pieces, such as sheet goods. Yet, they add only about 10" to the back of the saw when folded down—no tools needed—when we need to open up more floor space.

Under-the-table add-ons that boost performance

"Out of sight, out of mind" may work with the boss, but it's just plain bad policy when you're talking tablesaws. Those inner workings need periodic attention to keep your saw running true and accurately. These accessories make the job easier.

PALS (Precision Alignment and Locking System), $20 ▶

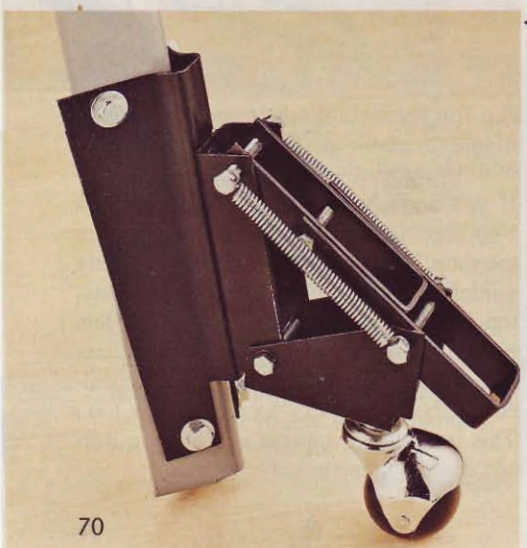
Inline Industries
800/533-6709, in-lineindustries.com

Own a contractor-style tablesaw? PALS may be the best 20 bucks you'll ever spend. After a quick 10-minute installation (PALS replaces your saw's rear trunnion bolts), you simply turn a screw to align the blade parallel to your saw's miter slots. The process is much more civilized—not to mention accurate and cleaner—than lying on the floor whacking your trunnions with a mallet.

Universal Mobile Base, $65 ▼

HTC (model HTC-3000)
800/624-2027; htcproductsinc.com

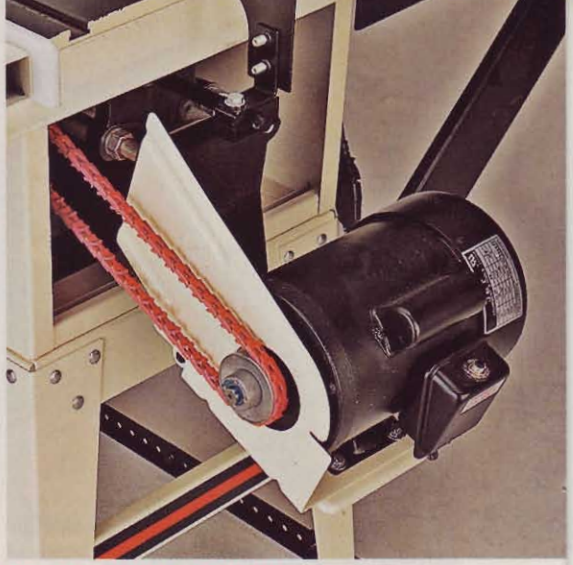
HTC has made smooth-rolling mobile bases for many years, and now they've added foot-operated wheel locks on the fixed casters, making it unnecessary to stoop over to tighten knobs. What we found really handy, though, is the foot-pedal locks that lift the swivel-caster end to keep the machine from shimmying while we worked. (That lock also retrofits some older HTC bases, if you want to upgrade.) We've listed just one base for pricing purposes, but you'll find these orange pedals on HTC's full line of universal and custom-fit bases.



◀ Retracting Casters for Contractor-Style Saws, $40 (set of four)

Woodcraft (item no. 141550)
800/225-1153, woodcraft.com

For less money than a full-blown mobile base, you can add wheels and stoop-free locking to a contractor-style saw (or virtually any other machine with splayed steel legs). Stepping on the spring-loaded lock lever on each Retracting Caster lifts the saw's leg about ⅛" off the ground; step on it again, and the saw rests on its own feet for a rock-solid foundation. Our favorite part: The ball casters swivel 360°, so we could move the saw any direction without having to jockey it into its parking space.



Power Twist Link Belt, $7 per foot ▲

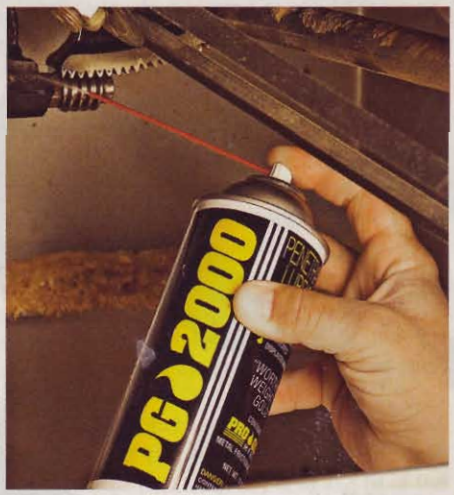
Rockler (item no. 52233)
800/279-4441; rockler.com

If your contractor-style saw sits idle much of the time, its drive belt will stiffen into an oblong shape. That can make your saw as jittery as a chihuahua chugging espresso. A Power Twist Link Belt tames the vibrating beast because it conforms to the drive pulleys like a bike chain to a sprocket, so it never sets into that oblong shape. Also, like a bike chain, you can loosen or tighten the belt by adding or removing links.

PG2000 Penetrating Lubricant, $8 ▼

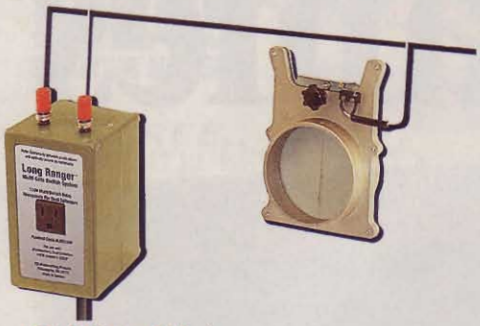
ProGold Lubricants
800/421-5823, progoldmfr.com

We used to recommend white lithium grease for lubricating the gears that control the blade tilt and elevation mechanisms. For the past couple of years, though, we've been lubing the saws in the *WOOD*® magazine shop with PG2000. Unlike heavy-bodied grease that turns sawdust into a gummy paste, PG2000 sprays on like water and bonds with the metal to create a low-friction barrier between parts. Dust doesn't stick to it, so it won't cling to bevel stops, where it can render them inaccurate.



Dial up your dust collection with these helpers

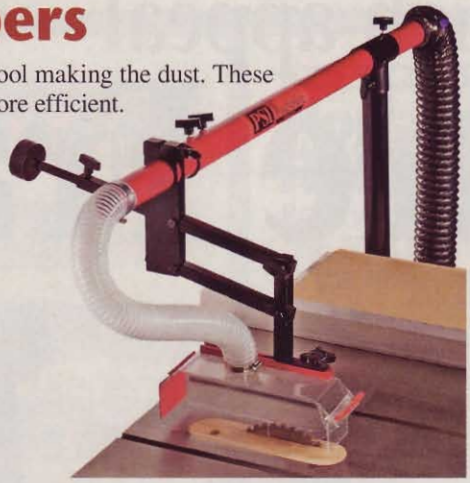
A good dust-collection system starts at the tool making the dust. These accessories make dust collection easier or more efficient.



MultiGate, $50 ▲

Penn State Industries (#LRMSET110)
800/377-7297, pennstateind.com

You'll be more likely to use your dust collector for every cut if you don't have to walk across the room to turn it on and off. Opening any blast gate on the MultiGate system sends a signal to the collector via low-voltage wiring and turns it on. Closing the gate turns it off. Once you buy the start-up kit (including one gate, the controller, and 100' of wire), you can add as many gates as you like for other machines. Each additional 4" blast gate costs less than $11, and you'll never hunt for the remote control again.



Tablesaw Dust-Collection Guard, $185 ▲

Penn State Industries
800/377-7297, pennstateind.com

As the blade cuts, gravity and momentum carry much of the sawdust down inside the saw; the debris either drops to the floor or gets sucked away by your dust collector. But invariably, some of the chips escape and are flung back at you. An overarm blade guard/dust-collection port, like this one from Penn State Industries, grabs those errant particles and sucks them away through the hollow arm. Meanwhile, the clear acrylic guard adds safety without restricting visibility.

FazLok Quick Disconnect Fittings, $26 ▲

Woodworker's Supply (starter kit #960085)
800/645-9292, woodworker.com

Many of us don't own a central dust collection system, so we drag a DC hose around from one tool to the next. To make the job faster and easier, FazLok Quick Disconnect Fittings were made. To connect, we just inserted the hose fitting into a mating fitting on the collector or tool and twisted it about ¼". The hose locked and was ready for action. Because the parts are transparent, we could see when a clog developed at either end of the hose. FazLok fittings come in both 4" and 2½" versions to fit standard-size dust-collection or vacuum hoses. Additional tool fittings cost $8 (2½") or $9 (4").

These three accessories add dead-on accuracy

The best-outfitted tablesaw in the world needs to be well-tuned or it means nothing. Check out some of our favorite measuring and setup tools.

TS-Aligner Jr., $135 ▲

Edward J. Bennett Co.
800/333-4994, ts-aligner.com

You get a lot of alignment for your buck with this setup tool that rides in your tablesaw's miter-gauge slot. In fact, TS-Aligner Jr. performs the five major tablesaw tune-up tasks (blade parallel to miter slot; fence parallel to miter slot; blade 90° to table; miter gauge 90° to blade; and fence face 90° to tabletop) with dial-indicator precision. Extend its value even more by using it to dial in alignments on other shop machines, such as your mitersaw, jointer, and planer.

Digital Angle Gauge, $40 ▲

Wixey
wixey.com

To check or set your blade's bevel angle, first set the Digital Angle Gauge on your tablesaw top and "zero" it. Now stick it onto the side of your blade, and tilt the blade. The LCD digital display shows the precise tilt of the blade, accurate to 0.1°. Your tablesaw doesn't even have to be level for it to work: The gauge simply shows how the angle differs from the surface you zeroed it to. We're not sure how Wixey can offer this handy and remarkably accurate accessory at this price, but we're not complaining. Read a full report of our test results on *page 95*.

Digital Fractional Caliper, $38 ▲

The Craftsman Gallery
866/966-3728, chipsfly.com

For measurements such as workpiece thickness or dado depth or width, we formerly relied on a dial caliper. It was accurate to .001", but hard to read. Then came digital decimal calipers that were easier to read, but still unintuitive. (Quick! Is .630" more or less than ⅝"?) Now comes this digital caliper that reads in fractional inches, such as 13/32" or 15/16", so we don't have to get out a calculator. Our fave feature: It shows dimensions to the nearest 1/64", but it also can convert to decimal inches or millimeters by simply switching display modes.

Written by **Dave Campbell**

Low-tech, High-appeal
Picture Frames

If you can turn on a router, you can turn heads with these eye-catching displays for your photos.

Picture frames show off life's most memorable moments. And when you create those frames yourself, well, that just puts icing on the cake. Rather than settle for basic rectangular frames, use your router table and a few common bits to surround your photographs with attention-getting craftsmanship.

Before adding the router details, you'll turn to your tablesaw, mitersaw, or bandsaw for a few basic dimensional cuts. After that you'll be ready to move to your router table. Don't have one? Make a simple one from a 2×3' sheet of ¾" plywood with a router mounted underneath and a plywood fence, clamping it along your workbench edge.

The rectangular frames we'll build here hold 5×7" photos (3×5" for the oval), but the techniques in making the frames work for any size. Fit smaller photos to these frames with mat board; for larger prints simply extend the frame dimensions to fit your photo. Check out the tips *above right*, and then let's get cranking.

Follow these tips for best results on all three frames

- To avoid workpiece tear-out and burning, rout in ⅛"-deep increments. Leave 1/32" for the final pass to ensure a smooth, clean finished cut.
- Sand individual parts, including all routed profiles, before assembly.
- Leave the protective covering on acrylic until it's ready for installation.
- Finish each frame with three coats of spray lacquer, sanding with 320-grit sandpaper after each coat.

Add pizzazz with laminated wood and splined miters

Contrasting woods—in both the laminated stock and the miter splines—give this frame spectacular depth and flair.

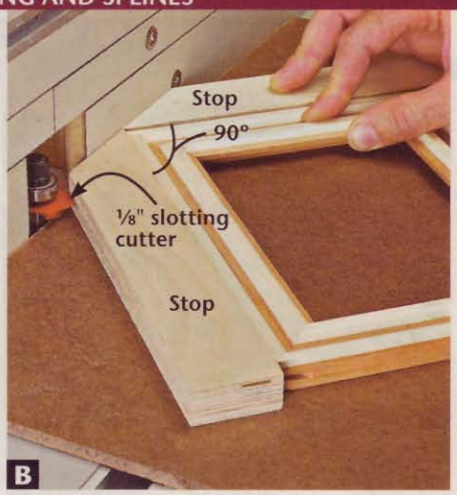
1 Begin by machining a 41" length of cherry to ½" thick × 1½" wide. Also, machine a 41" length of maple to ⅛" thick × 1½" wide. Laminate the two together, and then crosscut that piece into two 20"-long blanks. Mill an extra piece of ⅛"-thick maple 1" wide and 13" long for the splines.

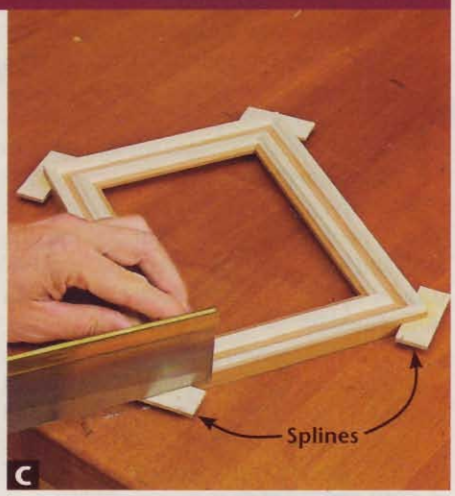
2 When the glue has dried, joint one edge on each blank, rip them to 1/32" greater than the 1¼" final width, and then joint away that 1/32" to remove the saw blade marks. If you don't own a jointer, you can do this at your router table using a straight bit. Shim the outfeed side of the fence to offset the amount of material removed. Or, use a handheld router and a straightedge.

3 Rout a ¼" cove 3/16" deep with a roundnose bit along one edge of the maple face of each blank **[Drawing 1a]**.

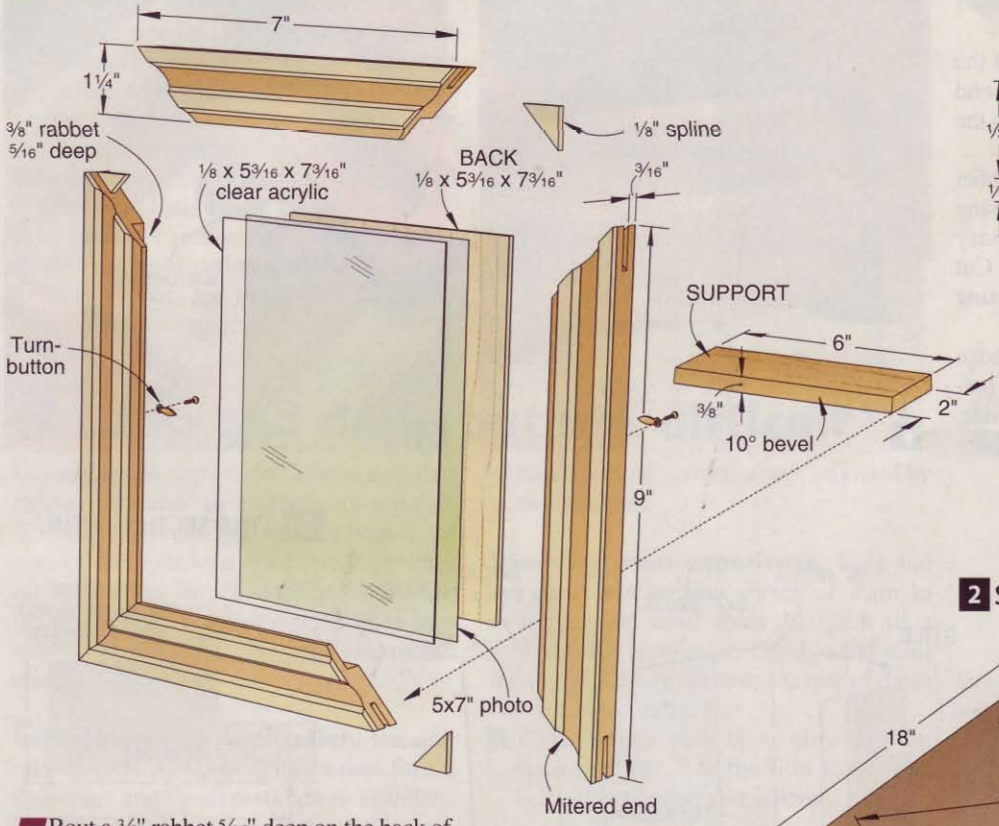
4 Use the same roundnose bit to rout a ½" flute 3/16" deep on the maple face **[Photo A]**.

ACCENT THE CHERRY WITH MAPLE FACING AND SPLINES

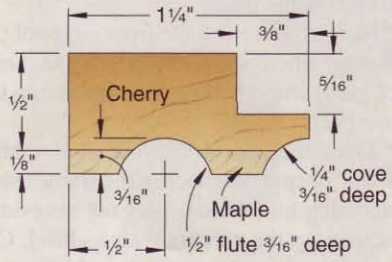




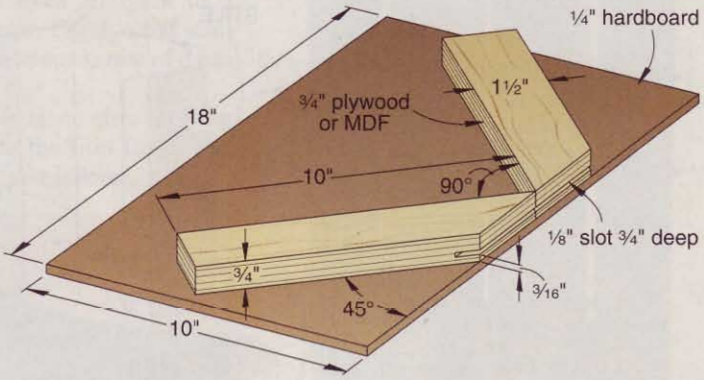
1 EXPLODED VIEW FRAME #1



1a FRAME SECTION VIEW



2 SPLINE-CUTTING SLED



5 Rout a ⅜" rabbet 5/16" deep on the back of each blank on the same edge as the cove.

6 Cut the frame sides to length **[Drawing 1]** with 45° miters at each end. Glue and clamp the frame using a band clamp.

7 While the glue dries, build the spline-cutting sled from ¼" hardboard and ¾" plywood or medium-density fiberboard (MDF) **[Drawing 2]**.

8 Now install a ⅛" slotting cutter in your router table centered on the cherry portion of each frame side. Adjust the fence so it's flush with the bit's bearing. Then, holding the frame in the sled and tight against both stops, rout the slots in all four corners **[Photo B]**.

9 Cut the maple spline blank into 3" lengths. Glue and insert the splines into the frame slots. After the glue dries, trim the excess **[Photo C]**. Then sand the splines flush to the frame.

10 Cut the back and acrylic to fit inside the frame's rabbet.

11 Cut the support to dimension **[Drawing 1]** with a 10° bevel on one edge. Glue that beveled edge flush to the frame bottom and centered side-to-side.

12 Finish the frame, then install turn-buttons to the back of the frame to hold the acrylic, photo, and back in place.

Avoid pesky miters with this half-lap frame

Do you struggle trying to cut dead-on miters? Then bypass them and do all your joinery at the router table.

1 Start by machining the rails and stiles to dimension **[Drawing 3]**.

2 Attach an extension to your miter gauge to prevent tear-out when routing the rails and stiles. With a straight bit, cut 1¼" dadoes 5/16" deep on the back face of both rails **[Photo D]**.

3 Rout 1¼" rabbets 5/16" deep in 5/8"-thick test pieces, and check the fit into the rail dadoes. (The back faces of the rails and stiles should be flush; adjust the bit depth as needed.) Rout rabbets on the front faces of the stiles **[Photo E]**.

4 Rout a ¼" cove on the inside corners of the rail ends **[Photo F]**. Next, rout (or sand) 1/16" round-overs on the front edges and ends of the rails.

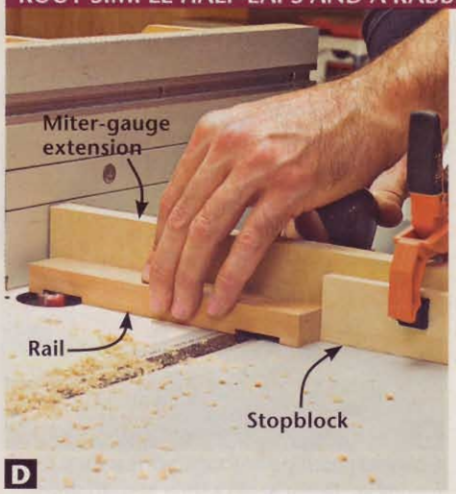
5 Rout ⅛" coves on the front edges of the stiles where shown in **Drawing 3a**. Sand each piece smooth, then glue and clamp the frame parts.

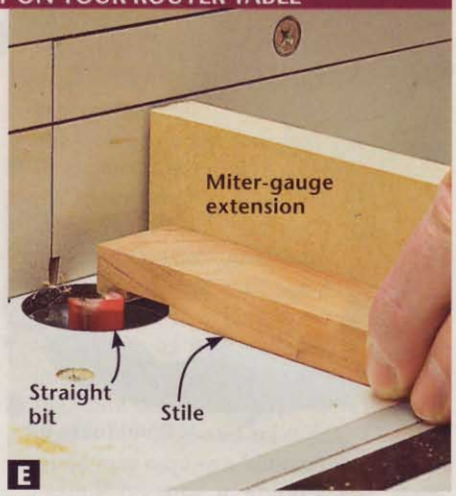
6 Once the glue dries, rout a ⅜" rabbet 5/16" deep on the back of the frame using a rabbeting bit **[Photo G]**. It's not necessary to square up the corners with a chisel. Cut the back and acrylic to fit the rabbet using rounded corners.

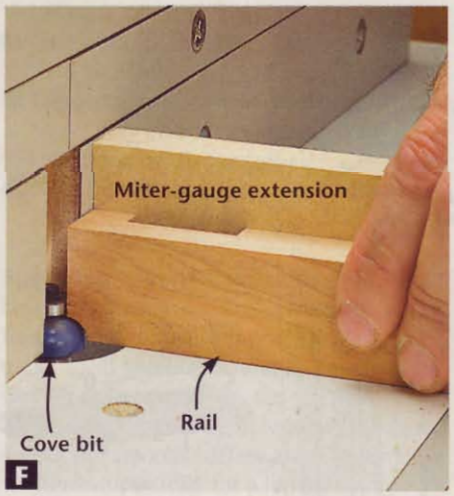
7 Cut the support to size, with an edge beveled at 10°. Glue it flush with the bottom of the bottom rail, centered side-to-side.

8 Finish the frame, and then install turnbuttons to the back of the frame.

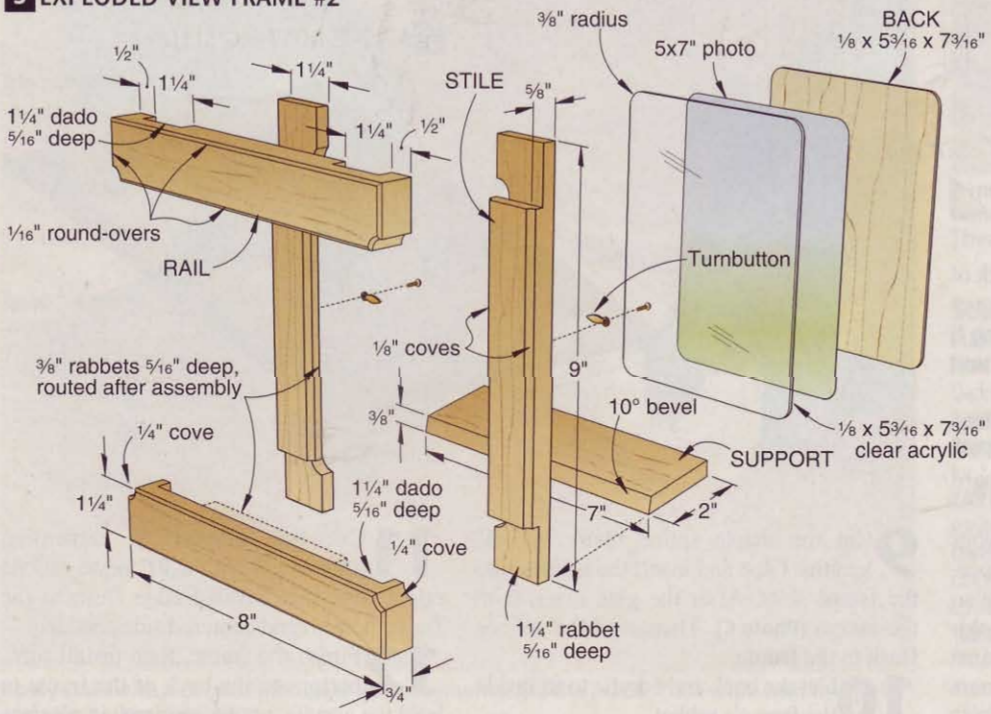
ROUT SIMPLE HALF-LAPS AND A RABBET ON YOUR ROUTER TABLE



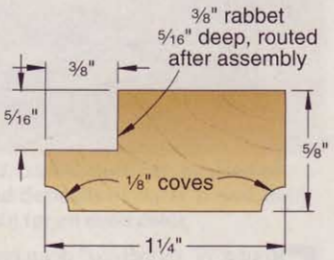


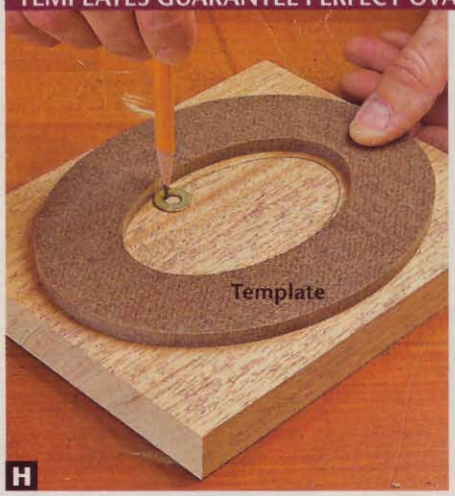


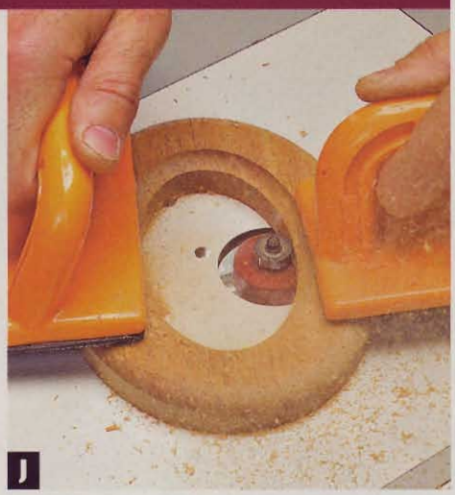
3 EXPLODED VIEW FRAME #2



3a STILE SECTION VIEW







Good-bye rectangles; hello elegant ovals

Even if you have trouble cutting a straight line, you can easily make this oval picture frame **[Drawing 4]** thanks to well-formed templates.

1 Start by making two copies of the frame pattern from the *WOOD Patterns®* insert on *page 53*. Mount one pattern to ¼" hardboard with spray adhesive; then cut and sand the template to size following the outer- and innermost lines. Double-face tape this template to a ¾×5⅛×6⅝" frame blank (we used mahogany). To help prevent warping, position your board's grain parallel to the longer dimension.

2 Using a #6 flat washer and pencil, mark lines **[Photo H]** along the outer and inner edges for rough cutting. Drill a blade-start hole near the inner line and cut along that line with a jigsaw and a fine-tooth blade. Cut along the outer line with a jigsaw or bandsaw.

3 Install a ½" or larger flush-trim bit in your table-mounted router with the bearing set to ride on the template. Rest the workpiece against a starter pin, then slowly ease the frame into the bit, beginning at the points indicated **[Drawing 5]**. Hold the frame securely with rubber-faced pushblocks so the spinning bit doesn't jerk it from your grip. Rout both edges flush to the template **[Photo I]**, following the recommended feed directions **[Drawing 5]**. Remove the hardboard template.

4 Rout a ¼" cove on the front inside edge **[Drawing 4a]**.

5 Rout a ⅜" round-over on the front outside edge.

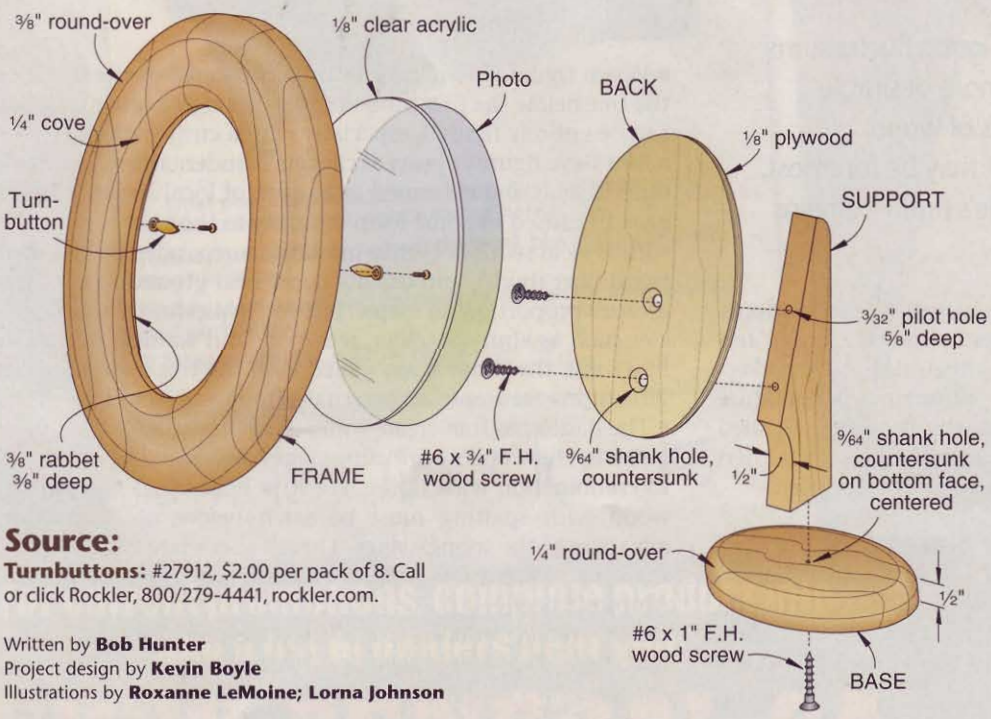
6 Rout a ⅜×⅜" rabbet along the frame's back inside edge **[Photo J]**.

7 Adhere a frame pattern to a ⅛" plywood back blank, and cut it to fit the rabbet by cutting and sanding to the oval dotted line. Trace the back onto a piece of ⅛"-thick acrylic, and then cut and sand it to match. Drill and countersink the mounting holes on the back where marked.

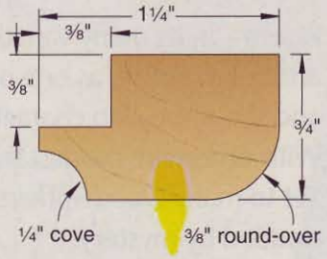
8 Using the support and base patterns, cut those pieces to rough size, and sand the edges to the outermost lines. Rout a ¼" round-over on the base's top. Drill countersunk holes where indicated on the pattern. (Glue the support to the back, let dry, then drill the two pilot holes.) Assemble the base, support, and back with glue and screws.

9 Finish the frame, then attach turnbuttons to the back where shown.

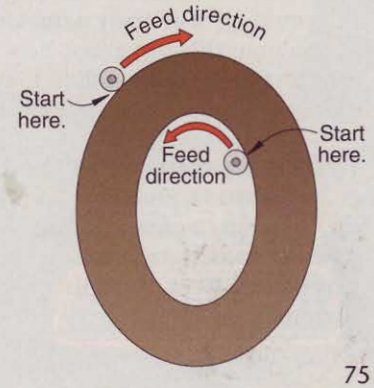
4 EXPLODED VIEW FRAME #3



4a FRAME SECTION VIEW



5 FLUSH TRIMMING START POINTS



Source:

Turnbuttons: #27912, $2.00 per pack of 8. Call or click Rockler, 800/279-4441, rockler.com.

Written by **Bob Hunter**
Project design by **Kevin Boyle**
Illustrations by **Roxanne LeMoine; Lorna Johnson**

Mill workers Lee Hearne, at left, and Kenny Brunt admire the freshly exposed tiger stripe and quilt figure in the bigleaf maple log just sawn by the 67" bandsaw at Hearne Hardwoods in Oxford, Pennsylvania.

The many faces of Maple

Figure—in its many variations of grain fluctuations and color—ranks as one of the more desirable and eye-appealing characteristics of wood. With otherwise modest maple, it may be foremost. Yet to many woodworkers, maple's figure remains clouded by mystery.

The term "figure" describes certain well-defined patterns in wood resulting from variations in texture, grain, and color. But talk about maple with other woodworkers and you'll spark as many names for its different types of figure as there are theories about how and why it occurs. To shed light on this confusing subject, we did heaps of research, then spoke with some knowledgeable figured-wood suppliers.

What causes figure in the first place?

A tree's location, nutrition, natural threats (fire, wind, disease, etc.), and rate of growth are all probable contributors to figure. Few, however, have been scientifically proven as directly responsible. Here, though, is what we do know with a fair amount of certainty.

- When figure does occur, it's usually located in the trunk of the tree below the first limb or fork, although a rare maple log can be entirely figured, especially with a curly pattern.
- Bird's-eye figure appears as clusters of indentations in a tree's outer tissues and is formed as a result of local suppression of growth caused by some form of injury to the tree.
- Burls yield swirls of eyelike markings surrounded by distorted wood fiber (buds), and usually occur near ground level in the greatest proportion on maple. But you'll also find them in species such as elm, boxelder, redwood, and walnut. Similar to bird's-eye, the cause is associated with the tree's spontaneous growth in reaction to an external stimulus of its wood cells.
- The dark lines that create zones in spalted maple come from fungi in the wood's beginning stages of decay, and can occur in combination with figure. For it to hold up to machining, wood with spalting must be sawn before decomposition advances to the spongy stage. There's also a rare type of staining called "ambrosia" or "ghost" caused by infestation of the Ambrosia beetle.

*(**Note:** Working with wet spalted wood has been associated with a few cases of serious respiratory infection, so as a precaution, machine only kiln-dried spalted wood and always wear a mask.)*

■ Crotch figure is obtained when sawyers cut through the fork just below where the trunk first branches. Maple crotch, because of unsightly ingrown bark in the fork, is not generally sawn for the marketplace.

Is figured maple uncommon?

Figured maple is hard to come by, according to Rick Hearne, owner of Hearne Hardwoods in Oxford, Pennsylvania. "In my state, if you were to cut 200 sugar maple trees, you'd be lucky to get one with good figure. In fact, I've visited a mill in Oregon that had maybe half a million board feet of bigleaf maple, yet only 1,200 board feet of it was quilted."

"Demand plays an important part, too," says Jim MacDermot, an associate at Gilmer Wood Company in Portland, Oregon. "Most of the really great figured maple goes for veneer and custom items, leaving little for the average woodworker."

How is figured wood graded and sold?

Sellers of figured wood follow the National Hardwood Lumber Association's (NHLA) grading rules for boards (FAS, Select, Common, etc.), but on top of that, add their own grades for figure, based on appearance. One seller, for example, might use grades that describe the amount of visible figure: low, medium, heavy, and musical-instrument grade. Another could grade this way: A (for minimal figure on one face) through AAAAA (for outstanding figure on both faces and/or unusual figure). Pricing is a combination of NHLA hardwood grade and the supplier's figure grade.

Figured-maple prices start at about $6 per board foot for a 4/4 board with modest figure and rise to $45 or more per board foot for highly figured, musical-instrument-grade stock.

It's about the same with burls, without the NHLA hardwood grading. For instance, a seller may grade burls (whole, slabbed, or as turning blocks) by category: From Mill Run (30%+ burl figure) to Museum (90%+ burl figure)—with several levels between— and sell them at a per-pound price. For example, a small, one-pound 2×4×4" slab of bigleaf maple burl with 50%+ figure can cost you about $10.

Written by **Peter J. Stephano**
Photographs: Courtesy of **Brian Hearne/Hearne Hardwoods**

Buying Tips

Due to the relative scarcity of figured wood, including burls, in the lumber industry as a whole, keep the following suggestions in mind when you shop:

■ Find a long-established, reputable seller who specializes in figured wood. "And if you're serious about working strictly with such specialty stock, visit the seller in person if you can," adds Rick Hearne. "The travel cost would be worth it to get you on the same page."

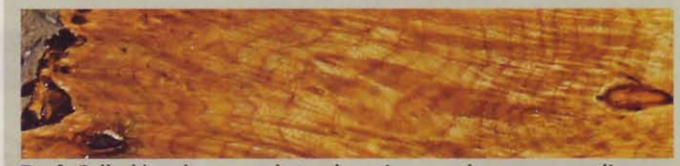
■ If you must buy by mail order or the Internet, understand all the terms the seller uses. "Know how the grade of figure is determined, the appearance of the figure [name, as explained at *right*], what defects there may be, and how the wood was dried," Jim MacDermot advises.

■ Order enough the first time. "A reorder may result in wood from a different tree, which could mean a slightly different color or figure pattern," MacDermot notes. "And understand the waste factor," Hearne says. "With bird's-eye maple, for example, you'll seldom see a board that has more than one-third outstanding figure, because veneer manufacturers buy the most highly figured logs. With curly and tiger, though, the whole board may have figure." For a list of suppliers of figured maple, visit woodmagazine.com/figuredmaple.

Figured-maple reference guide

Names describing figure often vary with the person giving the description, especially with veneer, because how the wood is cut determines the resulting figure pattern (and mostly enhances it). In lumber, naming is more straightforward. *Below* you see the most common types of figure found in maple boards, along with their accepted trade names and any necessary explanation.

Bird's-eye. No other names.



Burl. Called *burr* by some, but otherwise no other name applies. Large and most impressive in bigleaf (Oregon) maple. Usually sold whole or slabbed, but sometimes available in board form.

Curly. The undulating "waves" have a lustrous appearance when occurring in hard maple.

Tiger. Compared with curly, the waves or stripes are more numerous and closer together, and mostly in soft maple. "True fiddleback has even closer stripes in hard maple," says Rick Hearne, "and it's traditionally quartersawn."

Flame. Distinguished from tiger in that the stripes appear wavy and/or branched, resembling flickering flames.

Quilted. Exhibits a rectangular pattern of elongated, closely crowded patches. When the pattern of patches seems to bubble, it's called blister.

Spalted. No other names, although "spalded" is a spelling sometimes seen.

Wise Buys

Our Editors Test

Hold-ins/ Hold-downs

Why buy?

Apparently, someone was listening when a woodworker said, "I wish I had an extra set of hands." Those helping hands come from stock hold-ins and hold-downs, which secure workpieces on tablesaws, router tables, and other machines. We tested several and found that nearly all worked well at holding stock for accurate, consistent positioning—and preventing kickback—while cutters slice away. You can make your own hardwood feather boards, but they could break easier than the rigid plastic kind. Some of the higher-priced models apply side pressure and downforce simultaneously.

BENCH DOG FEATHER-LOC 10-005, $20; 40-011 (PAIR), $20

Editor test-drive:

The simplicity of these feather boards doesn't diminish their versatility and value. The first finger on the infeed side, ⅛" shorter than the rest, helps you set the correct pressure by simply resting that finger on your workpiece. Tighten the knobs (you have to hold the Feather-Loc parallel or the back end can move), and the other feathers automatically hold with the ideal pressure. I found this very helpful rather than guessing at it. The Feather-Locs also work great inverted as stops on the router table fence for stopped dadoes or grooves.

You need to mount a sub-fence with T-track onto your tablesaw rip fence or router table fence if yours doesn't have T-track built in. To test the Feather-Locs, I ripped hickory and hard maple and intentionally paused in midcut. There were no burn marks or kickback because the boards were pinned tightly against the fence. On the router table, I used a tall profile bit to make crown molding in white oak, and they held the 3½"-wide stock tightly to the fence, even at the top.

—Tested by Bob Hunter, Techniques Editor

To learn more:

800/786-8902; benchdog.com

WOODHAVEN MODEL 240K, $35

Editor test-drive:

This pair features high-density plastic "fingers"—guaranteed not to break—that are molded at a 4° angle away from the plate. The fingers then compress as you feed stock between them and a table or fence, creating just the right amount of holding pressure. Setting that tension is simple: Press the tool's fingers against your workpiece with pressure until they are touching parallel to the board edge, then tighten the knobs. The pair are interchangeable between the mounting attachments to accommodate different-size stock. Mount them to the fence-face T-slots, or on top with the included bracket. You also can remove the bolts and simply clamp them to your table or fence.

I ripped hard maple on the tablesaw, and the pair held the workpieces safely against the fence and table and away from the back side of the spinning blade. On the router table, I machined ⅜" round-overs and coves in pine and hard maple, and again the stock did not waver from its fixed path.

—Tested by Dave Campbell, Editorial Manager

To learn more:

800/344-6657; woodhaven.com

GRIP-TITE 2000, $40 EACH, $150 KIT

Editor test-drive:

I couldn't believe the holding power of the magnetic Grip-Tites. Not just for pinning workpieces against the fence and tabletop with canted abrasive wheels and super-tough plastic fins, but also the powerful grip of the magnets themselves. Nevertheless, they're quick to pick up and move by flipping a cam lever that pries the unit away from the metal surface.

No matter the amount of red oak, cherry, or pine I pushed through my tablesaw, the Grip-Tites didn't shift. And there were no burn marks when I deliberately slowed the feed rate, because they prevented the workpieces from creeping toward the blade.

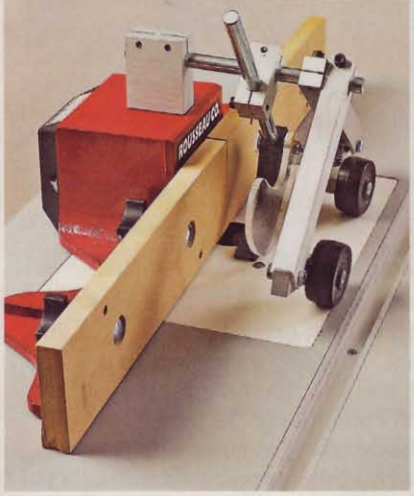
To use one as a hold-down, I flush-mounted Grip-Tite's optional steel fenceplate on MDF and attached it to my rip fence. On my steel-top router table, the Grip-Tites could be placed anywhere because they don't need a miter slot. This kit includes two hold-downs and a 42"-long steel fenceplate; a similar step-up kit features stronger magnets and choice of fence lengths and sells for $160.

—Tested by Bob Wilson, Techniques Editor

To learn more:

800/475-0293; grip-tite.com

ROUSSEAU 3301DL, $160



Editor test-drive:
Although it will not work on a tablesaw, this proved to be a very nice unit and worth the price tag for its advantages on a router table. The spring-loaded rollers have a 5° cant to pull workpieces toward the fence while also holding them flat to the table. This was especially beneficial when I used a large panel-raising bit on white oak door panels. Little or no hand pressure was needed to hold the workpiece against the cutter, making for incredibly smooth profiles.

I machined ¾"-wide poplar to form base shoe for my house trim. The curved UHMW hold-down and bit-guard fixture proved adequate for this, so you really don't need the rollers until you are using larger workpieces and larger bits. Loosen a setscrew, and they slide off the attachment rod.

I mounted the fence to my table with the easy-to-follow directions (you have to bore two ⅜" holes for this), but I did make one change: Instead of just tightening the carriage bolts so their heads seated into the substrate, I used threaded inserts to attach the bolts from underneath. Without them, the bolts could slip from their seated position when loosening the fence, allowing them to spin.

This fence offers other great extras besides the holding attachments: a molded port for a vacuum hose, a protective bit cover, and fence panels with side-to-side adjustments.

—Tested by Kevin Boyle, Senior Design Editor

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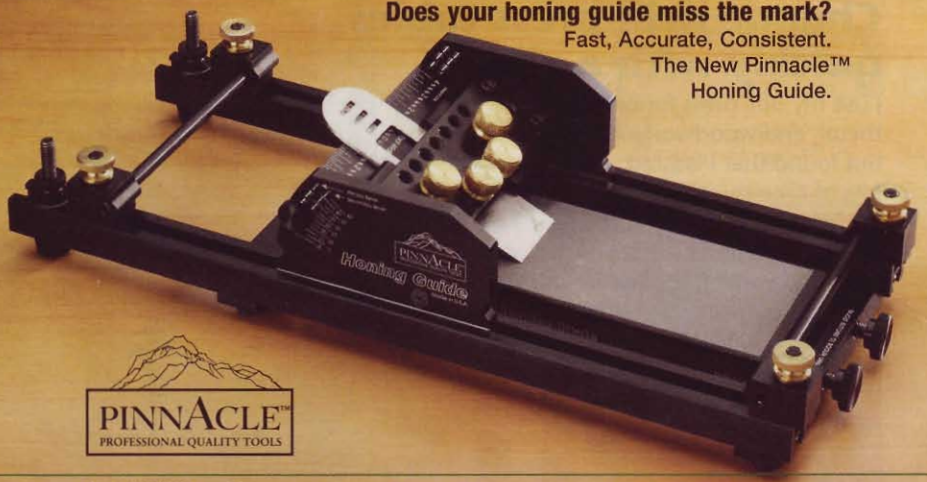

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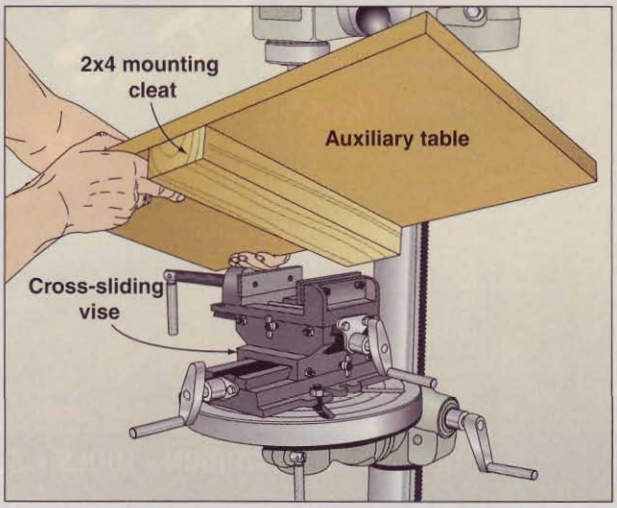
Shop Tips

Helping you work faster, smarter, and safer

Change drill-press tables quickly with a vise

Top Shop Tip

I use my drill press for both metal- and woodworking, but found that I wasted lots of time switching from my oily old metalworking table to one more suitable for woodworking. But now I change auxiliary tables as easily as a drill bit since I added a cross-sliding vise to my drill press table, as shown at *right*.



To install my auxiliary woodworking table, I mount a 2×4 cleat onto its bottom, and then clamp the cleat into the vise. Not only does this make changing tables lightning-quick, but I also can use the cross-sliding action of the vise to perform microadjustments for precise drilling every time.

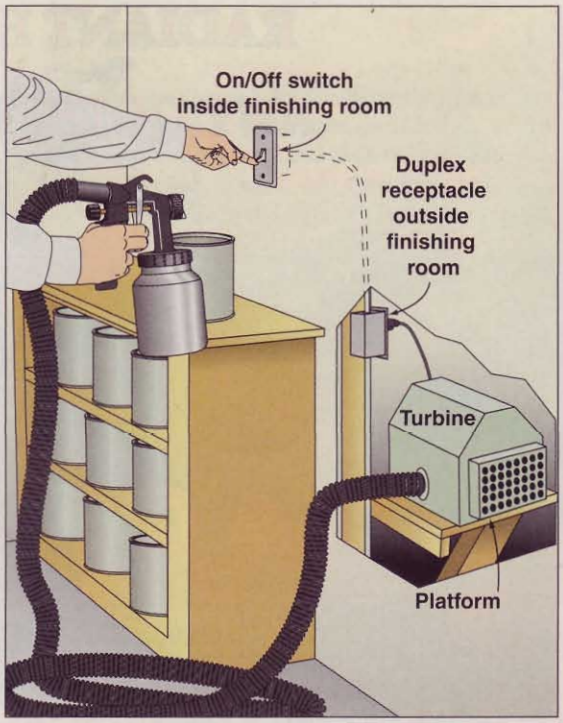
—Keith Stadler, Pisa, Italy

Cross-sliding vises are available in this country, too, from retailers such as Grizzly Industrial (G1064, $46, 800/523-4777, or grizzly.com).

—WOOD® magazine

Reduce HVLP noise and clogged filters

Some time ago I built a small finishing booth in my basement shop, where I shoot with an HVLP turbine sprayer. But the turbine was loud in that small space, and the air filter would load up with overspray. I solved both problems by moving the turbine outside the spray booth. Here's how.



I mounted a low platform just large enough to hold the turbine unit on the wall outside the spray booth, as shown. Taking a cue from a kitchen garbage disposal, I then wired a switched outlet outside the booth, controlled from inside the booth. With the turbine's power switch "on," I plugged it into the switched outlet. Finally, I bored a hole through the wall for the sprayer's air hose.

—Wayne Johnson, Grand Ledge, Mich.

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The Top Tipster

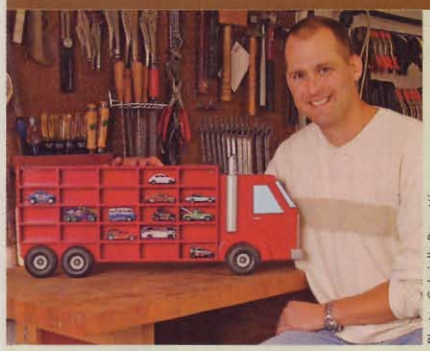

Photo: Gabriella Barsotti

Until recently, Sgt. Keith Stadler drove past the famous leaning tower in Pisa, Italy, every day on his way to work. He has since retired from the Air Force and continues to pursue his love of woodworking in Europe, where he met his other love, Nadine. His biggest challenge while living in Italy: "Buying supplies, such as finish or glue, when you can't read the language," he quips. "I learned to rely on a few trusted merchants to get me what I needed." Keith's Top Shop Tip, at *left*, proves equally practical.

We're shipping Keith Stadler the European version of Freud's FT3000VCE plunge router in return for contributing this issue's Top Shop Tip. Enjoy it, Keith!

Top tips earn tools!

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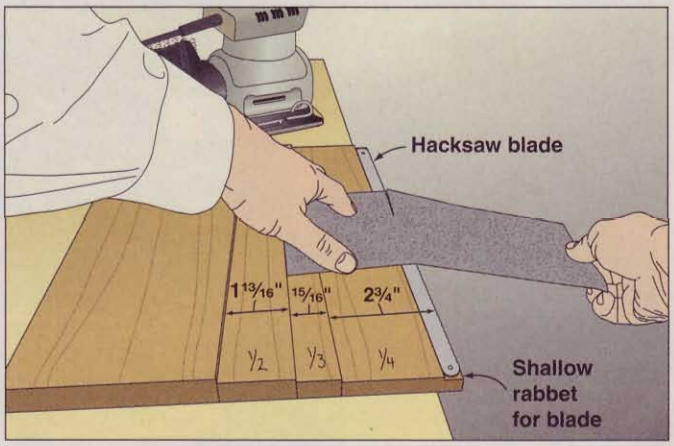
Shop Tips

Right-size sandpaper with this "cutting" board

Tearing sandpaper sheets to size is a tedious task made easier with this simple jig. First, cut some scrap hardwood to the length of a hacksaw blade. Rip three pieces to the widths shown *below* and plane them to slightly different thicknesses to create the "steps," as shown. Make a shallow rabbet for the blade in the 2¾"-wide piece and then edge-glue the pieces together. Epoxy the blade in the rabbet and you're ready to make piles of properly sized sheets in no time. By butting the edge of the abrasive against the correct step, you can tear-off half-, third-, and quarter-sheets for your power sanders or for hand-sanding blocks.

—Lynn Lawrenz, Algoma, Wis.

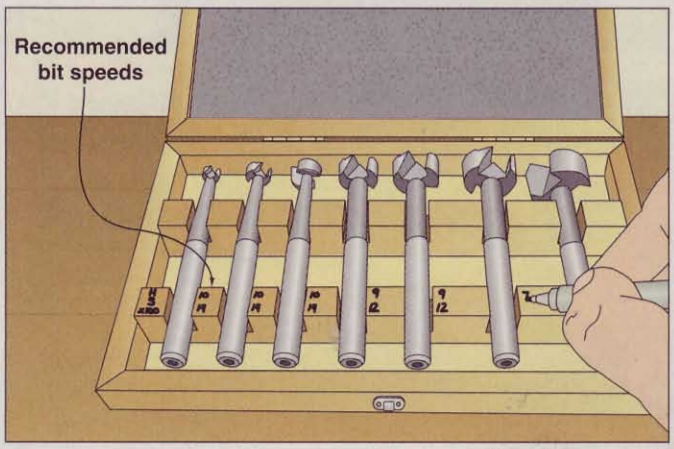


You have to know the limit to heed it

Every drill bit has its optimal speed where it cuts quickly without burning. You can keep a drill-press speed chart handy, but here's a no-fuss way to get the right speed for bit sets that come in cases. Write the recommended speed next to the bit inside the case, as shown *below*. Here's the method I use: On the top line, I jot down the softwood speed; below that, the hardwood speed. To save space, I drop the last two zeros from the number. For instance, 600 rpm would be expressed as a 6. A 23 indicates 2,300 rpm.

—John Anderson, Long Island, Va.

Download a free drill-press speed chart at woodmagazine.com/charts.



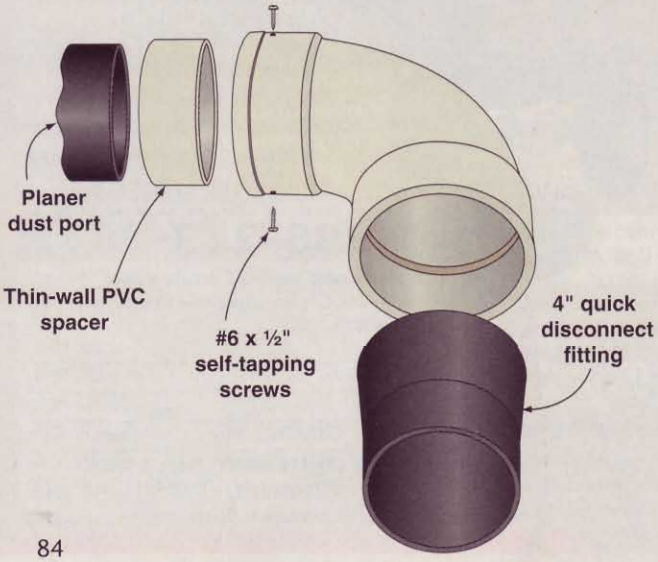
continued on page 84

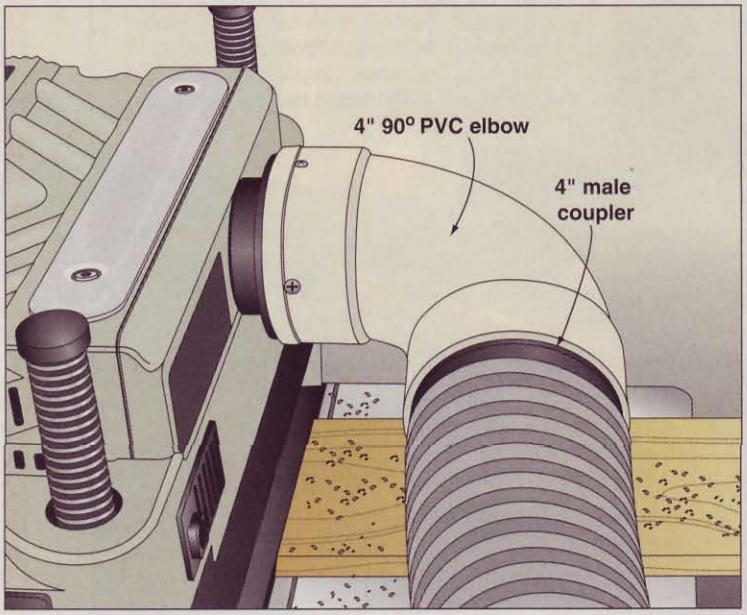
Tame heavy hoses with a strategically placed elbow

Every time I had to fight the large dust-collection hose on my planer—keeping it away from boards exiting the planer—I felt a little like Jim on *Wild Kingdom* wrestling a huge anaconda in the Amazon jungle. Growing tired of the struggle, I found a solution that gets the hose permanently out of the way.

By attaching a 4" 90° PVC elbow (thin-wall sewer pipe fits well) to the planer's dust port with self-tapping screws, as shown, you create a rigid platform that holds the hose out to one side of the planer. Next, connect the hose to a 4" male coupler (I used a Jet JW1047 quick-connect coupler, $5 at amazon.com), and fit the coupler into the elbow when you use the planer.

—Kelly Churchill, Medford, Ore.





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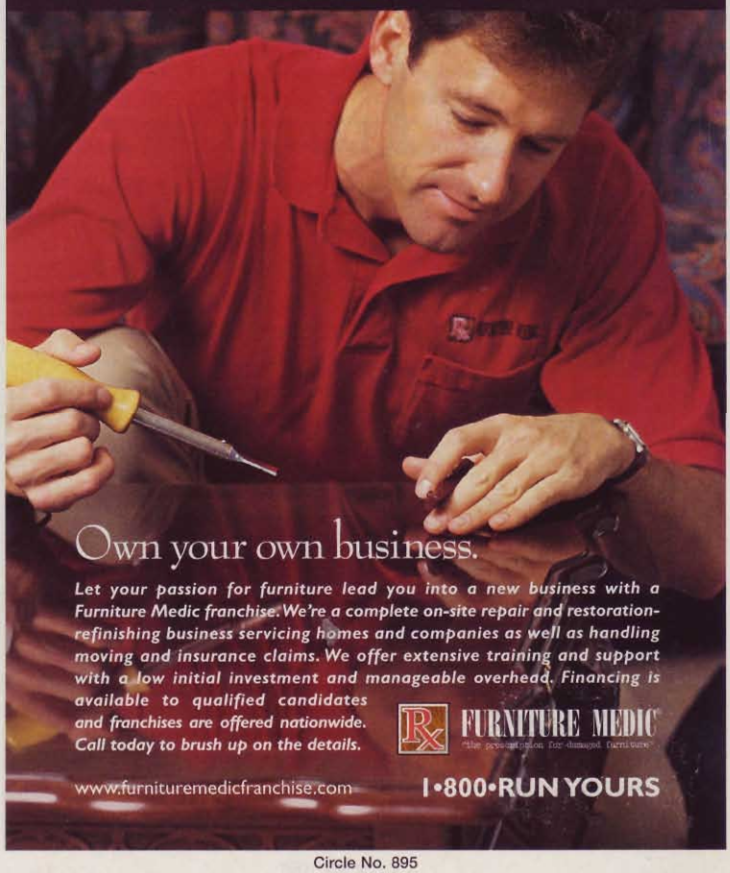

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Circle No. 895

Piggyback your lathes to save space, be sturdy

As I was trying to find a home for my new mini lathe on my already crowded bench, I realized that with a little creativity, it would fit on my full-size lathe. Here's how you, too, can save shop space and give your mini lathe extra stability.

Create a ¾"-plywood base for your mini lathe. Rip a cleat from 2x material to snugly fit the gap between the ways of the big lathe's bed. Attach the cleat to the center of the plywood base and mount the mini lathe to the base. (Be sure to countersink the mounting-screw heads so the base rests firmly on the rail bed.)

To install the mini lathe on its big brother's back, move the tool rest and tailstock out of the way and slide your mini lathe into place. Secure the base with clamps, as shown.

—John Stacy, Garwood, Texas

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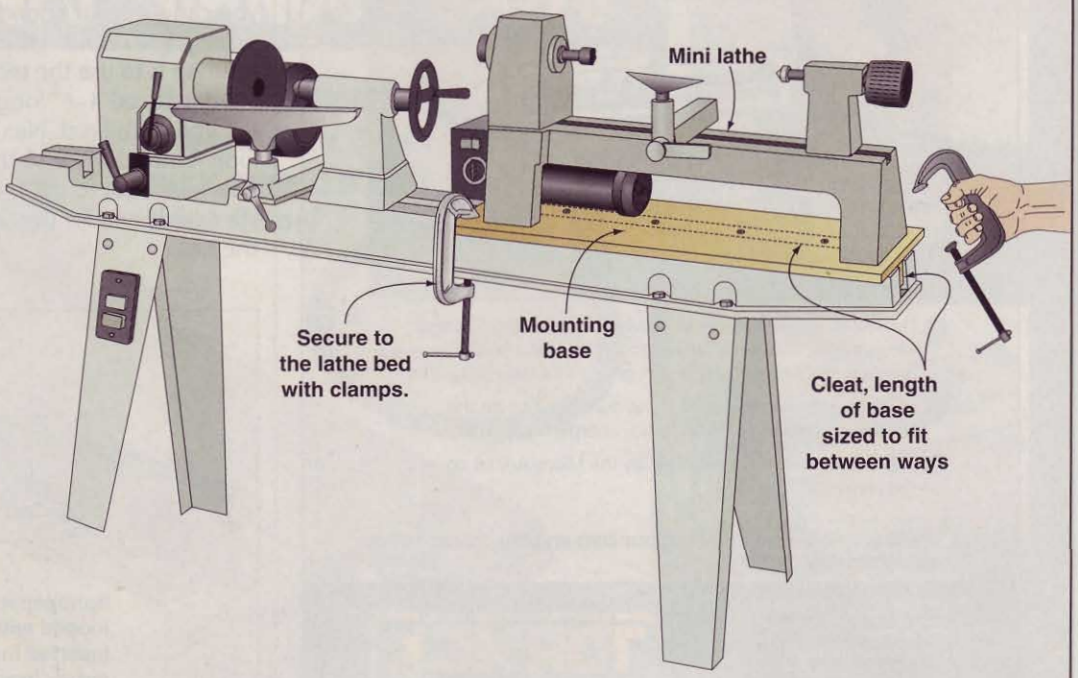

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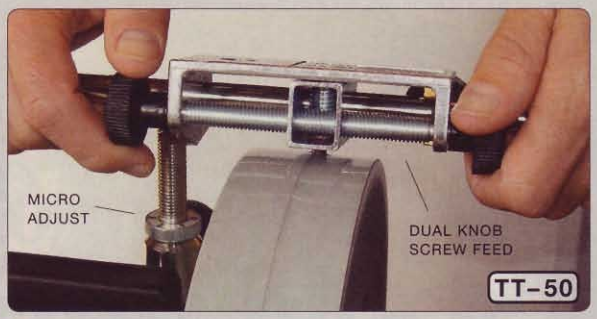

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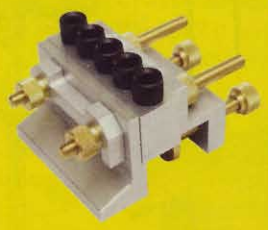

- Dowelmax transforms a hobbyist into a professional. Note 6 degree angle on left and right side rails.
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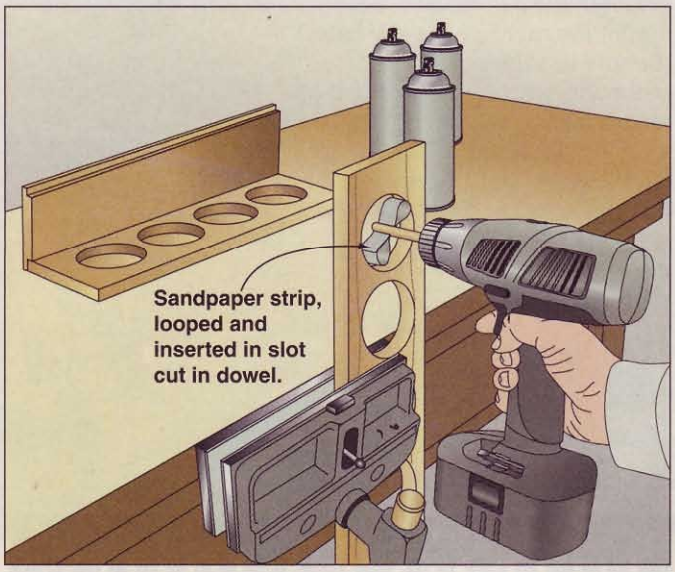
Circle No. 825

Shop Tips

To sand circles, strap on this gritty "bow tie"

If you need to sand the inside of a large hole for finishing, you can use your fingers and a good deal of patience, but usually, the results will be uneven. A better and faster solution is to use the technique shown *below*. Cut a piece of ⅜" dowel rod 4–6" long and use a bandsaw to cut a slot into the end of the rod. Next, take a strip of cloth sandpaper and loop it into the slot so that the loop is slightly larger than the hole you want to sand. Install your hole sander in a variable-speed drill and let the sanding loop smooth the inside of the hole.

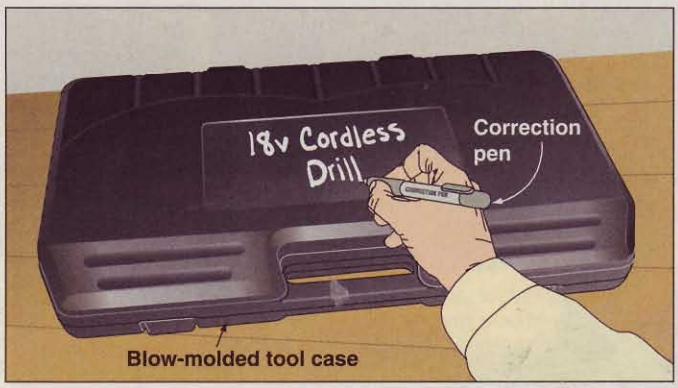
—Daniel Kingsberry, Gatineau, Que.



Correction pen ends the old shell game

Many portable power tools come with clamshell carrying cases that protect the tools and keep their accessories organized. But after you've collected quite a few of these cases (and many of them are dark, with few identifying features), confusion starts to gain a foothold. For easy identification of the hidden treasures, I mark the name of the case's contents with a correction pen. The white ink is durable and contrasts nicely with the case for easy identification.

—Jack Ipson, Highlands Ranch, Colo.



continued on page 88

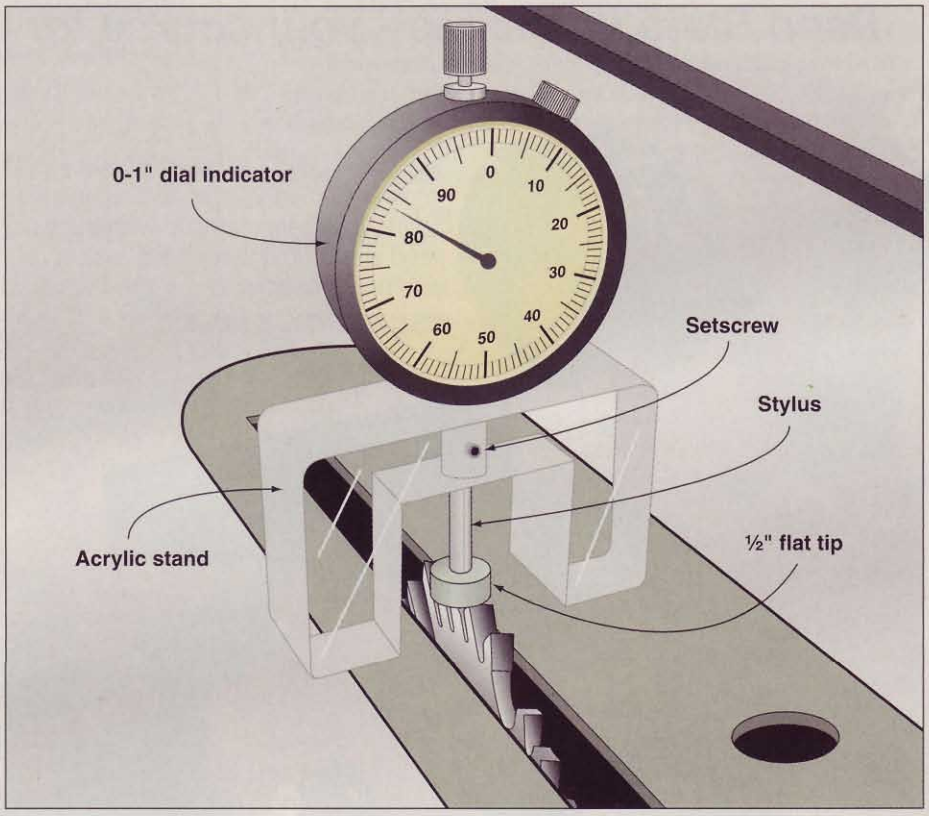
Dial in blade height for ultimate accuracy

Unsatisfied with the "almost" accurate results I would get from setting the blade and bit height on my tablesaw and router, I created this simple dial-indicator stand that brings surgical precision to establishing cutting depth.

To create the stand, cut it as shown from ¾"- or 1"-thick acrylic (my first choice) or hardwood. In the top of the stand, drill a hole large enough for a 0–1" dial indicator's mounting sleeve and install a setscrew to hold it firmly in place. Next, add a ½"-diameter flat tip to the indicator's stylus. The tip is necessary because of the alternating bevels of the saw blade's teeth.

To use the indicator, first zero it out against the tablesaw table or router base, then position it over the blade or bit and measure the depth of cut. These inexpensive indicators—$13 to $20—provide accuracy to within .001" and the satisfaction of getting the most out of your tools.

—John Lorbiecki, Hubertus, Wis.



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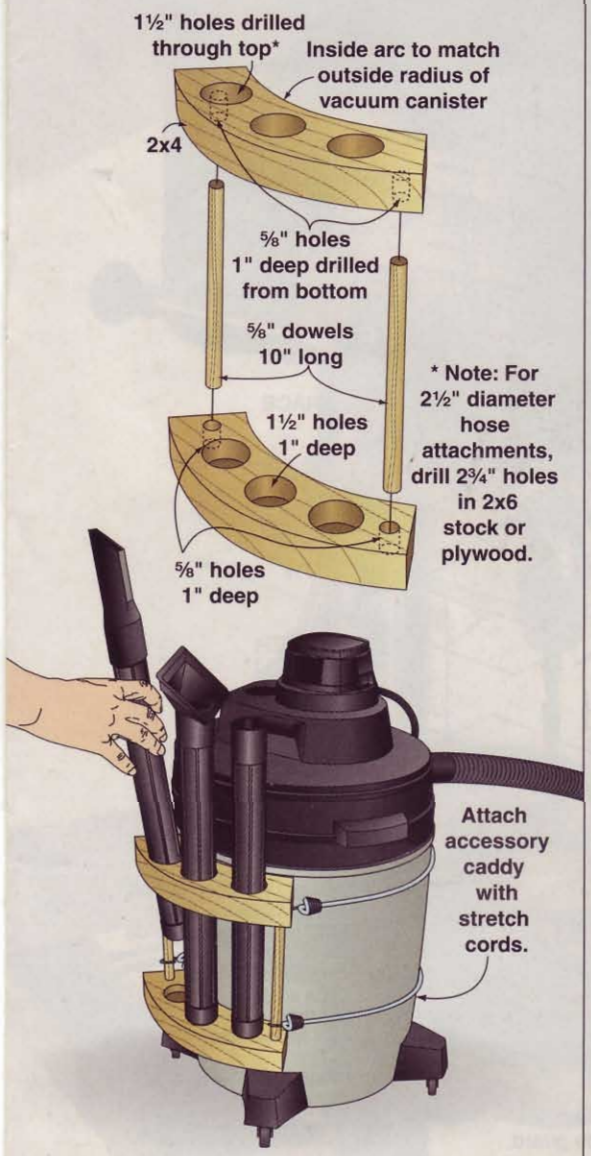
Circle No. 1515

Wet/dry vac rack reins in wandering attachments

One of the most valuable tools in my shop is the wet/dry vacuum. However, like lost socks in a dryer, I had a serious problem keeping track of the various attachments. My solution was to build the wooden rack shown *below* to provide a stable home for the wandering attachments.

I cut the curved rack parts for my 1¼"-diameter vacuum accessories from scraps of 2×4; for 2½" accessories, you may need to go with 2×6 stock. (The arc of your vac canister also figures in here, too.) Your best bet is to create a cardboard template to fit the contours of your canister. After assembly, secure the rack to the vac with stretch cords attached to the dowel rods.

—Charles Beach, Morganton, N.C.


1½" holes drilled through top*
Inside arc to match outside radius of vacuum canister
2x4
⅝" holes 1" deep drilled from bottom
⅝" dowels 10" long
1½" holes 1" deep
⅝" holes 1" deep
* Note: For 2½" diameter hose attachments, drill 2¾" holes in 2x6 stock or plywood.
Attach accessory caddy with stretch cords.

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1427 36 x 7 x 7 1/2

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Quick & Easy Jig

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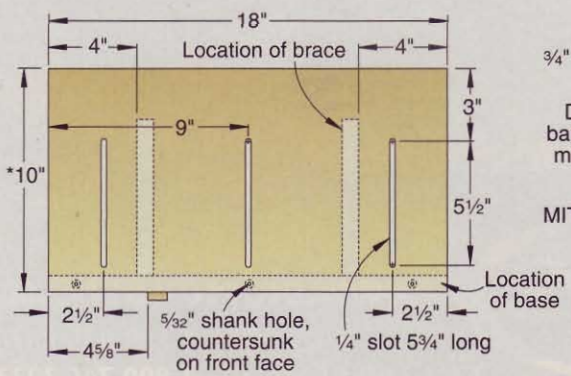
The more we worked with this jig the more we liked it for turning found wood into valuable stock. Here, we'll cover the basics of using this jig for ripping small logs and other odd-shaped blocks of wood into short boards.

Cut the jig pieces to shape

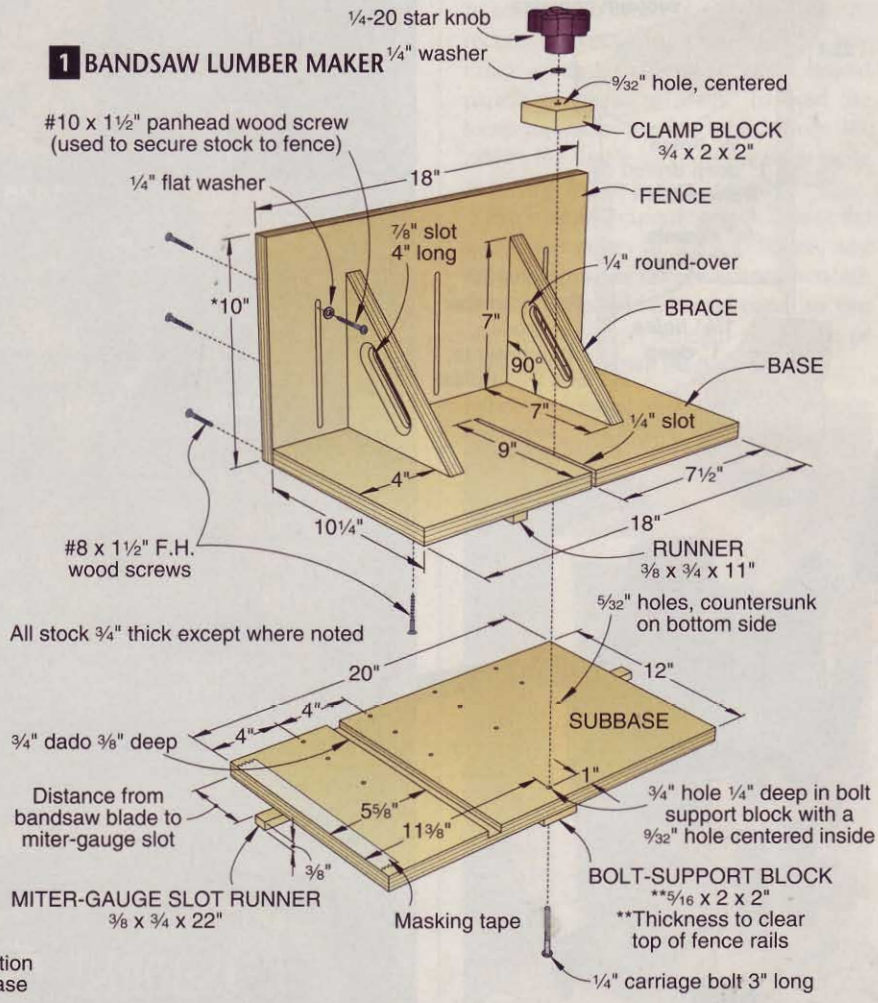
Cut the subbase, base, fence, bolt-support block and braces to size from ¾" plywood [**Drawings 1** and **1a**]. The height of the fence will be determined by the clearance of your bandsaw blade guard to the bandsaw table. Bandsaws with riser blocks and 16" bandsaws will rip wider stock and allow for a taller fence than the clearance of a standard 14" bandsaw.

Cut the dado, drill the holes, and form the slots in the pieces where marked. See

1a FENCE (Blade side shown)



1 BANDSAW LUMBER MAKER



*Height of fence will depend on clearance between bandsaw table and blade guard.

continued on page 92

[**Drawing 1a**] for slot locations in the fence. We've intentionally offset the middle slot in the fence to the knob slot in the base to better access the middle fence slot. Cut the runners to size from solid stock. Rout ¼" round-overs on the handle openings in the braces. Assemble the jig in the configuration shown using glue and screws. Add finish to the different pieces. Do not glue the runner to the base as you have to remove it later for certain operations.

Caution: Resawing exposes large portions of the bandsaw blade as the blade guard has to be raised just above the workpiece to allow the stock to move through the blade. When making cuts, the blade is often hidden in the wood being cut. Always know exactly where the blade will exit the wood and never push the workpiece at the blade exit point when finishing a cut. Use a block of wood as a pushstick if needed.

Using the subbase as a sliding table

For log half sections and other workpieces too large to fit between the assembled jig subbase and blade guard, secure the log section or workpiece to the subbase with wood screws, making sure that the screw heads are countersunk so they don't scratch the bandsaw table surface. For a stable fit against the subbase, machine the bottom surface of the workpiece as flat as possible. A hand plane, power plane, or wide jointer work well.

Draw a cutline on the bottom surface of the workpiece of where you want to make the first bandsaw cut. Position the subbase upside down on the workpiece and line up the edge of the subbase with the marked cutline. For stability, the subbase should cover at least half of the workpiece to keep the workpiece from tilting when bandsawn. Screw the workpiece to the subbase.

Position the jig on the bandsaw table with the miter-gauge slot runner in the miter-gauge groove and make the first cut [**Photo A**]. Do not use this process for a round piece of wood (log or branch). For round stock use the subbase with the fence for maximum stability. For a free article on chainsawing log stock to size, visit woodmagazine.com/chainsawblanks

Combine the subbase and base/fence for max support

Secure the base/fence assembly onto the subbase with the carriage bolt and knob, and screw the workpiece to the fence in at least two places. Some workpieces [**Photo B**], might need to be shimmed to keep them perfectly stable when cutting. With the workpiece screwed to the fence, position the workpiece so it overhangs the subbase by about 1" to allow for drying and planing. Tighten the knob to secure the base to the subbase. For long stock (over about 18") we recommend using a helper or an infeed and outfeed table to keep the jig flat on the bandsaw table when starting and finishing the cut.

Make the first ripping cut [**Photo C**]. The handle openings in the braces allow you to push the stock through the blade while keeping your hands clear of the cutting blade. Turn the saw off, and back the jig and stock past the blade once it has stopped moving. Using a combination square, mark an increment line on the masking tape [**Photo D**]. Allow about ⅛" extra for the kerf and any possible machining (sanding or planning) you want to do to the resawn stock later. For example, if you need ½" finished stock, mark ⅝" increments.

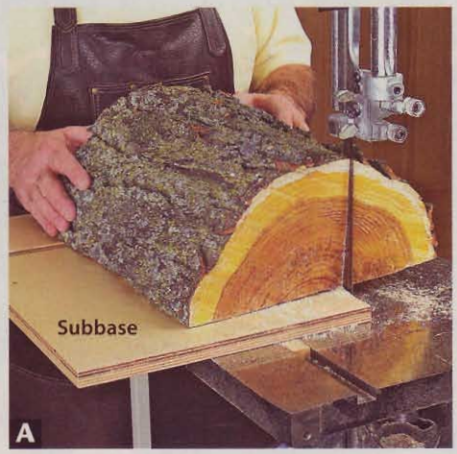
Loosen the knob and reposition the fence/base assembly on the subbase, aligning the outside edge of the fence with the next increment mark on the masking tape. The runner on the bottom of the base allows you to move the base/fence parallel with the subbase and bandsaw blade, allowing for consistent width from the front to the back of the piece being cut.

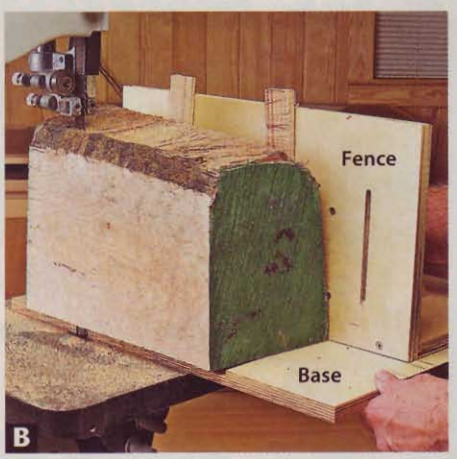
Tighten the knob and make the next cut. Determine exactly how far the screws through the fence enter the workpiece to avoid hitting the screws with the blade. Our 1½" screws protrude into the workpiece ¾", so we never cut closer than 1¼" from the fence allowing us ½" of clearance between the blade and ends of the screws.

Using the fence for standard resawing operations

Remove the base/fence from the subbase. Place the base/fence assembly between the bandsaw column and blade [**Photo E**]. Adjust the position of the fence to the blade for the desired thickness to be cut, and clamp the base/fence to the bandsaw table keeping the fence parallel to the miter-gauge slot. It's important that the workpiece have a flat bottom to ride on the bandsaw table.

Written by **Marlen Kemmet** with **Chuck Hedlund**
Illustrations: **Roxanne LeMoine; Lorna Johnson**
Project Design: **Brian Hahn**, Avoca, WI





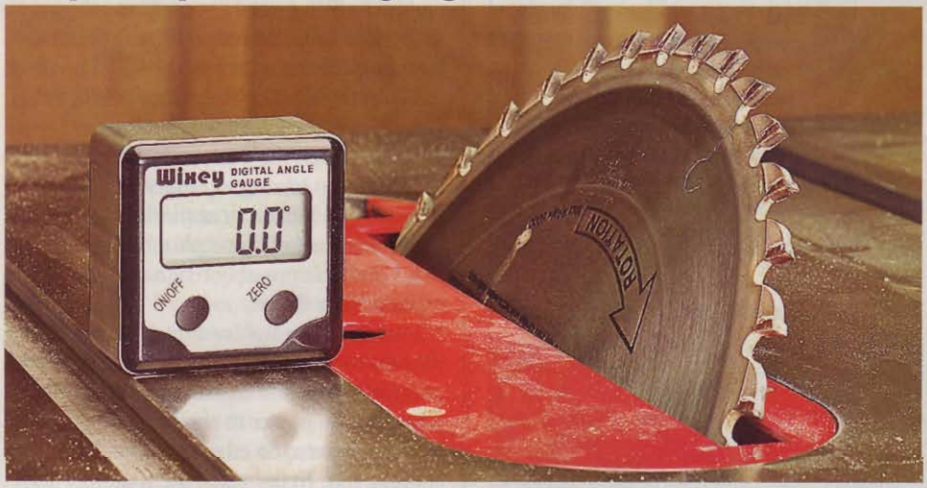
Shop-Proven Products

These woodworking wares passed our shop trials

About our product tests

We test hundreds of tools and accessories, but only those that earn at least three stars for performance make the final cut and appear in this section. Our testers this issue include: **Pat Lowry**, **Steve Feeney**, and *WOOD*® magazine Projects Editor **Jan Svec**. All are avid woodworkers.

Simple, sophisticated gauge sets bevels and more

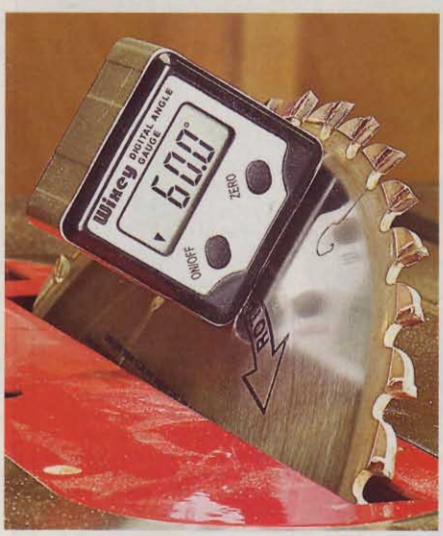


As a woodworker for more than 30 years, there aren't many tools and accessories that make me say, "Wow!" Wixey's Digital Angle Gauge definitely is one of them. This compact setup tool measures the angle between two surfaces, such as a tablesaw top and blade, and displays that angle (+ or - 180° to the nearest 0.1°) on an easy-to-read LCD.

Inside the Digital Angle Gauge is a sort of electronic "plumb bob" that lies against an electronic protractor. When you rest the gauge on a reference surface (tablesaw top, for example) and press "zero," all angles it shows will be relative to that tablesaw top until you zero it again. Built-in magnets stick the gauge to vertical surfaces, such as a bandsaw blade, or the tablesaw blade shown at *right*, so you can measure the angle between the blade and the tabletop.

I was skeptical that a $40 gadget could be that accurate, so I compared it with my machinist square. With my tablesaw blade raised, I saw no light between my square and the blade body, so I declared the angle 90°. As the Digital Angle Gauge rested on my tablesaw, I zeroed its display, as shown at *top*. When I rotated the gauge to stick it to the blade, it disagreed with my square, saying the angle between the tabletop and blade was 90.1°.

I needed a tie-breaker, and a couple of quick test-cuts in some 2"-thick maple scraps proved the machinist square wrong. I reset the blade bevel to 90° using the Digital Angle Gauge, and the test-cut revealed perfection. I repeated my tests at 45° and once again found the electronic



Digital Angle Gauge

Performance	★★★★★
Price	$40

Wixey
digital@wixey.com, wixey.com

Wixey gadget more reliable than my machinist square.

Before I knew it, I had gone through most of the machines in my shop, dialing in everything—jointer fence, bandsaw table, and mitersaw bevel stops, to name a few—with the Digital Angle Gauge. Keep in mind that because it relies on gravity to make its measurements you can't use the Digital Angle Gauge to measure horizontal angles, such as the miter stops on your mitersaw.

—Tested by Pat Lowry

Wall-mounted collector proves quiet and capable

When floor space in the shop gets tight, the only place to go is up, whether on the wall or hanging from the ceiling. General International's 10-060 M1 wall-mounted dust collector saves on floor space and does a good job of gathering workshop debris. That, despite its 2½" inlet that makes it seem more like a shop vacuum than a serious dust collector. It's nowhere nearly as noisy as a vacuum, though, thanks to its ¾-hp induction motor that makes it sound more like a tablesaw than a router.

I used the 10-060 M1 on every dust-making power tool in my shop, from my drill press to my tablesaw. It sucked away the refuse as well as a larger floor-standing collector, perhaps because the smaller-diameter hose increases the air velocity.

My shop vacuum could never keep up with the volume of chips generated by my planer because its tub filled too quickly. Not a problem with this unit's 30-gallon bag. It mounts on the bottom of the 1-micron rated fabric filter that mounts to the bottom of the machine. I did find it a bit difficult to install the collection bag on that filter by myself, because it's not rigid like the bag rim of a traditional collector.

Make no mistake, though: The performance of this collector falls somewhere between a full-size dust collector and a shop vacuum. Its chief selling point is the floor space (and your aching eardrums) that it saves.

—Tested by Steve Feeney

10-060 M1 Dust Collector

Performance	★★★☆☆
Price	$350

General International
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continued on page 96

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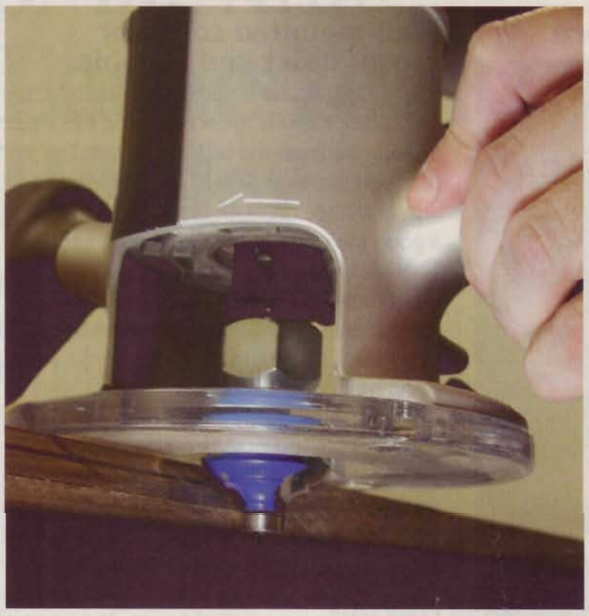

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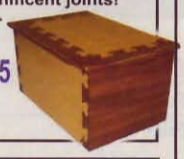

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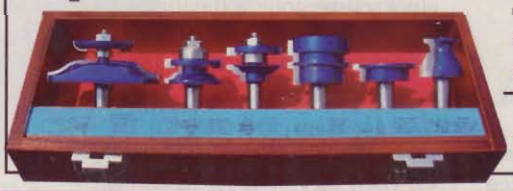

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Circle No. 310

Shop-Proven Products

I-Driver offers a new twist on right-angle drills

At first glance, Bosch's I-Driver looks like an ordinary cordless right-angle drill driver, and it does play that role very well. But this versatile driver's head also pivots and locks into any of five angles, ranging from right angle to inline driver (like the old powered screwdrivers).

With the I-Driver's head set at 90°, I easily readjusted some false drawer fronts and reinstalled the pulls on a cabinet in my shop without having to empty its contents. Rotated and locked in at the 157.5° detent, I used it to install some plumbing brackets that I couldn't possibly reach with any other drill or driver.

Powered by a lightweight 10.8-volt lithium-ion battery pack, the I-Driver feels comfortable and well-balanced in my hand, with enough power to easily drive ¼×2½" lag screws into the edge of a 2×4. Run time is great, too: In my tests, the tool consistently drove more than one hundred 3" production screws into pine on a single charge. (Recharging the lone battery pack that comes with the I-Driver takes about 30 minutes.)

The quick-release chuck accepts only ¼" hex-shank bits. Because that style of chuck allows a drill bit to wiggle some, precise hole placement can be hit-or-miss. But for driving screws, it works fine. I used the seven-position sliding clutch when driving brass screws, and the screws pulled snugly without damage. I also like the soft-start feature here, where even a robust pull of the I-Driver's trigger results in a slow but steady ramp-up to full speed.

—Tested by Pat Lowry

I-Driver (PS10-2)

Performance	★★★★★
Price	$150

Bosch
877/267-2499, boschtools.com

continued on page 98

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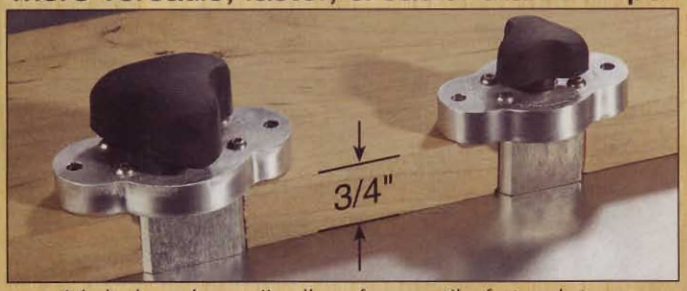
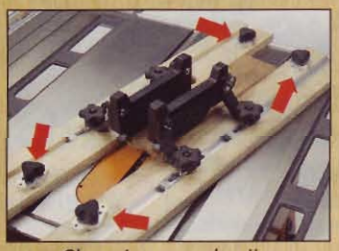
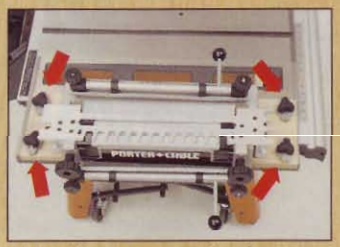


A hole through your jig allows for versatile, fast and strong clamping. If necessary, MagJigs can be secured with screws.



Clamping complex jigs anywhere on a table is a cinch.



MagJigs are versatile; they can be moved from set-up to set-up.

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Circle No. 2016

Shop-Proven Products

Digital depth display is router's best quality

With more power tools sporting lasers, a digital display, or both, I knew it wouldn't be long until somebody put one or the other on a router. Always innovative, Craftsman is the first company to offer a plunge router (model 17517) factory-equipped with an easy-to-read, lighted digital depth gauge.

Just like setting up a typical plunge router, you first plunge the bit so it touches the workpiece, then lower the 17517's rack-and-pinion-style stop rod to the base. Press the "zero" button on the display and then raise the stop until the display shows the depth of cut to the nearest 1/64" (or .1 mm). Lock the stop in place and make your cut.

To test the accuracy of the gauge, I used the 17517 to rout through-dovetails around a template. Relying only on the digital display, I set the cutting depth to leave an extra 1/64" at the ends of both pins and tails. Without making a test cut, I plowed the dovetails and assembled the joints. Both pins and tails were 1/64" proud—exactly as I wanted them. Three words: Accurate, easy, and impressive.

The 17517 offers plenty of power, its low center of gravity helps it feel well balanced, the plunge mechanism operates smoothly, and dust collection proved effective. But a few things about the tool bugged me. For one, I noticed some play between the plunge posts and their bushings. I didn't have any trouble with bearing-guided bits, but when I routed a progressively deeper dado with a 1/2" spiral bit, the dado also grew wider, starting at .500", and ending up at .515".

Second, the variable-speed dial on the 17517 is recessed into the front of the router body, presumably to prevent accidentally changing it midcut. But that also makes it more difficult to use when you intentionally want to change bit speed.

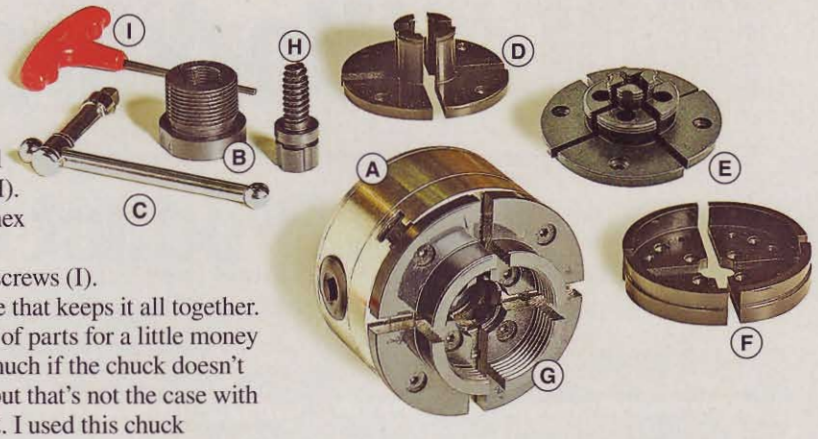
—Tested by Pat Lowry

Plunge Router #17517

Performance	★★★★☆
Price	$140

Craftsman
800/377-7414, sears.com

Four-jaw lathe chuck with five-star value



The multiple work-holding options provided by a four-jaw lathe chuck (sometimes called a scroll chuck) make many turning operations so much easier than using a faceplate. Once you have one, you'll wonder how you ever got by without it. Four-jaw chucks always have been pricey, though, especially when you add the extra jaws to make it really versatile.

Thumbing through the Penn State Industries catalog a few months ago, however, I stumbled onto a bargain I thought had to be too good to be true: a fully accessorized four-jaw chuck, called "Barracuda2," for only $170. I ordered one to check it out, and the news is good.

Let's start with all the stuff you get:

- A nicely machined chuck body (A) threaded for a 1" × 8tpi (threads per inch) spindle with a ¾" × 16tpi adapter (B), operated by a very positive and easy-to-use square-drive T-handle wrench (C).
- Four sets of jaws (D, E, F, G) that hold objects from 3/32" to 4⅛" diameter in external-grip mode, and from 1 1/16" to 4⅞" diameter in internal-grip mode.
- A substantial screw center (H).
- A T-handle hex wrench for the jaw-mounting screws (I).
- A handy case that keeps it all together.

Getting a lot of parts for a little money doesn't mean much if the chuck doesn't perform well, but that's not the case with the Barracuda2. I used this chuck extensively for more than six months, turning several vessels up to 11" in diameter and three small tapered display pedestals. Every time I used it, the Barracuda2 held the workpiece securely, and I felt both comfortable and confident while turning with it.

For bowl turners, there's an extra bonus. Two different sets of flat jaws for gripping bowls by the rim also are available: one with a capacity up to 5" diameter ($25), and another up to 8" ($30). Comparable jaw sets for other chucks run about $85.

Bottom line: For less than the cost of most other chucks with one set of jaws and a screw center, you get a really great little chuck, including all the accessory jaws you'll likely ever need. If you turn stuff larger than 12" in diameter, you should go with one of the more hi-fi chucks on the market. But for most of us occasional turners, the buck stops here.

—Tested by Jan Svec, Projects Editor

Barracuda2 System (#CSC3000C)

Performance	★★★★★
Price	$170

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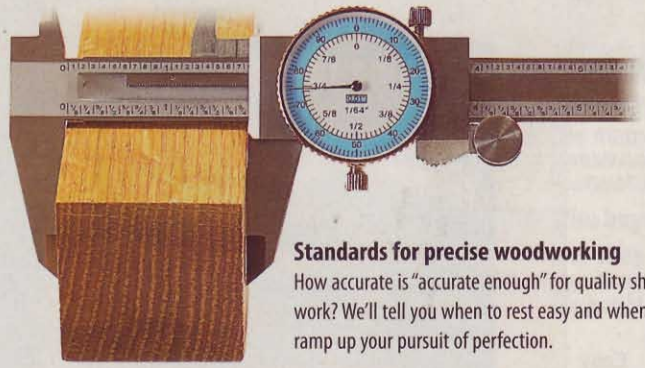
What's Ahead

A sneak peek inside the July issue (on sale May 15)

FEATURED PROJECT

Bistro table

You can buy everything you need for this project at your home center on Saturday, and (thanks to the simple construction) apply a coat of finish on Sunday.



Standards for precise woodworking

How accurate is "accurate enough" for quality shop work? We'll tell you when to rest easy and when to ramp up your pursuit of perfection.

TOOL NEWS

Replaceable-cutter router bits

These super-tough bits outlast conventional brazed-carbide bits many times over. Find out if they're right for you.

Software secrets

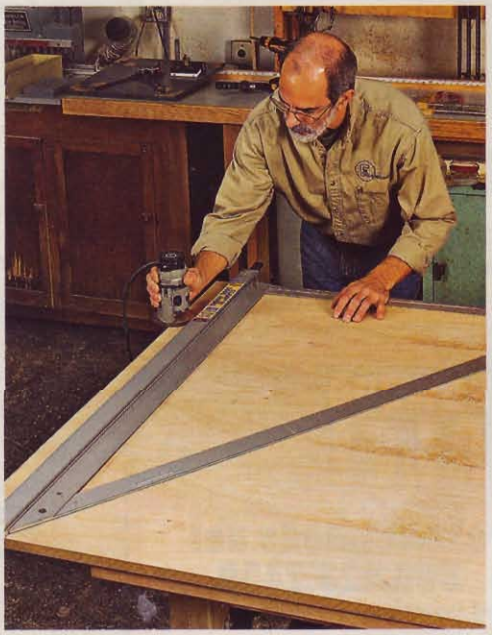
Want to design projects on your home computer? Now you can! Today's design software is far friendlier and more affordable than you might think.

Stackable bins

With just one sheet of medium-density fiberboard, a half-sheet of hardboard, and a small piece of poplar, you can build and stack three identical units shown *above*. They're perfect for kids' rooms, entryways, and garages.

Jewelry stand

Gather those highly figured pieces of scrap you've been hanging on to, and transform them into this quick-to-make gift.



Don't swear, get square

Woodworking sure is a lot more fun when your tools and techniques yield squarely machined and assembled workpieces. Learn from a pro how it's hip to be square.

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